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Narratives Through Apparent
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Aalborg University Copenhagen
Frederikskaj 12,
2450 København S, Denmark

Semester Coordinator:
Stefania Serafin

Secretary:
Lisbeth Nykjær

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Supervisor(s):
Henrik Schønau-Fog

Project group no.:
N/A

Members:

Kasper Ingdahl Andkjær
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Abstract:

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The application was tested for closure and intelligibility through the following problem statement: *"How can Apparent Behaviour be used in an interactive narrative context, where a story is interpreted with a general level of intelligibility towards the author's intention?"*.

Conclusively, the answering of the problem statement was not entirely met. The attempt at heightening closure to a stable level failed, though intelligibility results seemed to have more success.

It can thereby be said that for an apparent behaviour framework to be usable, more work is needed and a proper stimulant for closure needs to be found.

AALBORG UNIVERSITY COPENHAGEN

Plato's Apparent Democracy: Building Interactive Narratives Through Apparent Behaviour

by

Kasper Ingdahl Andkjær

A thesis submitted in partial fulfilment for the degree of
Masters in Medialogy

in the
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Department of Architecture, Design, and Media Technology

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"Every science, and every branch of philosophy, developed a technical terminology intelligible only to its exclusive devotees; as men learned more and more about the world, they found themselves ever less capable of expressing to their educated fellow-men what it was that they had learned.

The gap between life and knowledge grew wider and wider; those who governed could not understand those who thought, and those who wanted to know could not understand those who knew."

- Will Durant, The Story of Philosophy

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Abbreviations

IN	Interactive Narratives
IDN	Interactive Digital Narratives
RTT	Recorded Text Testing

In this report I present a suggestion for the use of a overlooked type of narrative discourse for use in interactive narrative research.

The suggestion is made in part as a comment to the focus on big superfluous storytelling systems which Interactive Narrative research bothers with today, and as an experiment on the use of intelligibility for Apparent Behaviour¹ as an abstract storytelling method.

Reading guide

The project has been separated into 3 parts:

- I. Purpose: Where the background for this project given in detail, so that the reader understands the purpose of the later design and study, as well as the motivation for my performing them.
- II. Practise: Contains an analysis of current Apparent Behaviour and Perception of Causality research, as well as how these fields have been incorporated into the design of an application.
- III. Testing: Finally describes the design and performance of a test upon the designed application, in which the intelligibility of the intended message and the general performance of the application is measured and discussed.

Each chapter starts with a short description of its content and context (not unlike this one) and ends with a short summary of what that chapter established. These are meant as content-anchors, and a help to keep track of the chapters' relations, especially for readers who only read parts of the project.

For the coherent A-Z reader, these parts should be largely negligible.

¹The notion that people tend to make up narratives when none was intended (see section [1.2.2](#))

Part I

Purpose

Intro

This first part will be focusing on the purpose of the project, and the theory one needs to be familiarised with to properly understand my motivation.

In the first chapter: [Motivation](#), the general setup is presented, what the project wants to achieve, and why. Most, to the project, important areas of research are also presented here. At the end the reader should be familiar with General Narratology, Interactive Narratives and Semiotics. My critique of current Interactive Storytelling-research is also presented here as well as a personal attempt at explaining Apparent Behaviour's existence. Finally, it culminates with the general purpose of the project: Building an Interactive Narrative application through Apparent Behaviour, and measuring the application's success at authored intelligibility.

In [Means](#), a more thorough presentation of the two most important topics: Apparent Behaviour and Intelligibility are presented. Furthermore, a short walk-through of Emergent Narratives is presented and contextualised to Apparent Behaviour. At last, the project's scope is presented, in which to detail which kind of intelligibility research I can hope to conduct with the available resources.

Chapter 1

Motivation

This project is an attempt at creating an Interactive Narrative Application using a sociological phenomenon named Apparent Behaviour. Given the highly abstract and impulsive narratives which apparent behaviour forces upon its audience¹, I thought it well fitted for an experiment in which it was used to create semi-authored narratives in an interactive — albeit scripted — setting.

In this chapter, the theory and thought which has been put into this goal is detailed.

1.1 On Narratives and Interactivity

Narratology has, in its informal form, been around since the moment man perceived the first story. When they made the first sense of the world around them, build linguistic structures around its content and conveyed those to others who interpreted and gained an understanding from and of those. That is when Narratology was born.

As a discipline, Narratology concerns itself with the analysis of stories - the way they work as structures, the way people tell them, and the way people perceive them when told.

The word Narratology was coined in French by Tzvetan Todorov (Then 'Narratologique'), but was first recognised by the father of scientific thought and grand-son of philosophy in general: Aristotle ([Aristotle, 350 B.C.E.](#)). The field in its current form, however, was minted by Russian formalists in the 1920s. ([Abbott, 2007](#); [Jenkins, 2004](#)).

To better understand the Narratological structure, one could start with what it aims to describe: A story. For this, a small second-person narrative about a person being

¹Read: The player/the watcher/whoever is experiencing the work

controlled by a voice in the sky, has been selected from among Bjarke Larsen's works (Larsen, 2015). It starts as follows:

"You cower at the edge of the hut. You feel a slight chill in the air, a cross breeze as you skirt along the side, your hair animating in all directions. The hut is there, small and seemly, but you know that's just a façade. You know you best avoid its hollow gaze. You peek around it.

> No, you don't.

You don't peek around it. You stop, unsure what's going on. Worried who this new voice is, telling you what to do.

> Walk.

And you begin walking.

— Larsen (2015)

This segment from 'The Hut' can be separated into 3 parts: The *story*, the *discourse*, and the *plot*.

We have first, the content: 'You' exist, and cower around the hut until someone tells you to walk, which you do. This is what exists in the world, and is going on. By the Russians, this was called the *fabula*, by the French it became the "histoire", and we in the English-speaking world know it as *story*.

However, the place where 'you' cower as well as the voice do not exist in the reader's mind without a description, and there is a multitude of ways the writer can choose to convey that content. They can be descriptive, vague, feed the information over long stretches of time with many things in between, perhaps play with the way readers understand things based on a lacking description. Notice how, in 'The Hut' we do not yet know who the voice is, a thing we are left to wonder for the rest of the story. And wonder who the voice is is what we are supposed to. Notice how it is the reader who is placed in the story world, and it is the reader who is being told that they wonder what is going on.

Consider the following: The main character has been led into the hut by the voice. Agitated by this, the main character has decided to call the voice 'idiot'. At this point, one crazy idea which idiot has had has actually worked, and the main character is left to wonder if idiot is actually somewhat competent.

> Walk

.Right. Leave the hut. You walk forward, wind and harsh sun crashing into you. Before you relax, though, you realise there's something wrong. Dead wrong. It's difficult to see in the outside brightness after being trapped inside,

but once you get used to it, you see a pair of eyes staring at you. Two glowing spotlights staring from the shrubbery.

> What's that?

"Well, I don't bloody know," you say. It looks bad. They are large and glowing, yellow and green at the same time.

> Let's go say hi.

You try to sigh, but you give up. You accept that this voice might know what it's doing. The eyes crane along as you approach, following your movement. As you get closer, you hear a roar from the eyes and a giant creature the size of a house reaps out at you, claws first, nailing through you, and teeth — that, you must admit, are like spears — unravel your body until it is only pieces.

> Whoops.

— [Larsen \(2015\)](#)

Every single choice of wording in this paragraph, and every pacing decision, is, what is known as *discourse*. The details which the audience is given to know of the main character's agony, the way their thoughts are presented, the pacing of the scene, even the decision to make the reader believe in idiot's competence only to be surprised when it backfires for the main character, is a decision on how to present the story.

Discourse is the 'form', the way a story is presented, and it constitutes the second if the three Narratological pillars. It was, again, the Russian formalists who first separated fabula (content - story) from *sjuzhet* (the way it is told - discourse). These two categories then underwent several name-changes, while fundamental French — and later English — Narratologists proceeded to flesh out the new field. *Sjuzhet* has finally, in the British-speaking world, come to be named discourse thanks to work such as [Chatman \(1980\)](#). ([Abbott, 2007](#), pp. 41)

There has been a great deal of debate about the intricacies regarding this separation. At once story seem to precede its rendering because it needs to exist before it can be told. On the other hand, the way the story is told, as we have seen, so heavily influences what story is received that the content might be said to not really exist before it has been mediated ([Abbott, 2007](#)). I will return to these discussions in [1.2](#).

1.1.1 Event

The third pillar of classical narratology deserves, perhaps, a more thorough explanation, given that the term's lay-man use has so wholly encapsulated what is here called story, and many narratologists also disagree on the definition.

To start, I will first address ‘*events*’; a term which all definitions seem to share. Narrative events describes happenings in the story-world.

Continuing our adventure in ‘the hut’: The main character has just been ripped to shreds and is lying in bits all over the floor.

> I can do better than that.

You agree. That wasn’t Idiot’s best performance. For once, you would have liked to stay alive.

— 01

You cower at the edge of the hut. You feel a slight chill in the air, a cross breeze as you skirt along the side, your hair animating in all directions.

> Let’s not go in there, then.

At least Idiot won’t get you killed the same way. But the voice has probably got more dumb ideas. You wonder if you’ll ever finish this quest with Idiot controlling it all. You wonder if you’ll ever get past the Hut.

— [Larsen \(2015\)](#)

The end to Larsen’s short story provides a very clear cut between when you are being eaten by a terrible something, and when you find yourself outside the hut again, doing exactly what you were doing when you started.

The narrative can here be separated into the time when you were eaten and idiot said they could do better, and the time when you were cowering outside the hut. again. The transition from one state to the next “you are being eaten / you are outside the hut” is the event, it is where the story ‘reboots’ which is interesting. Likewise, the first time the main character started walking towards the hut, when they entered, and when they first saw the glowing eyes, are each moments when something changed in the story-world’s arrangement. “You are walking” is the state, “you started walking” is the event ([Herman, 2004](#)).

1.1.2 Plot

Within Narratology, it is the form and nature of these events that has the field in such dispute. This third pillar of narratology is named *plot*.

Suffice it for my purposes, however, to give a short overview of these theories: The core of the dispute can be boiled down to the purpose with which one wants to use plot. Some

sees it as describing a sequence of cause-and-effect in the story-world; the "then and then and then" of the chronological happenings in the world. Others believe that plot is the very distinction of 'then' that makes these happenings into a story; If everything is a continuous flow of changing state, it is the selection and presentation of select events which creates the story; It connects the states into events which have meaning and form (Abbott, 2007, pp.43-44). Notice how this view starts drawing inspiration from discourse as well as the view that a story cannot exist before its telling, even if story seems to precede it. One would also be forgiven for drawing parallels to Aristotle's 'muthos', and his classic dramatic structures (Aristotle, 350 B.C.E.).

A third view, which I personally subscribe to, sees plot as even more of a story-telling device than the first. Here, the plot is closely tied to discourse, and concerns each narrative event as it is laid out to the viewer. Plot would here also become the order in which events are laid out and told, rather than how they appear outside the rendering. Flash-backs, frame-stories and the like all define the order of the plot here. Plot is thereby given more power to define and shape the story and the reader's understanding, as this is so intricate to in what order things are revealed (Abbott, 2007, pp.43-44).

1.1.3 Interactivity and Narrativity

When Narratology first arose with Aristotle and second through the Russians and the French, people usually saw narratives as static (if personal) constructs, which were told by a narrator to an audience. Later it was written down in a book for a reader, and then it was recorded on camera for a viewer to consume. At all times in a static way. The quest to describe and analyse every kind of narrative that ever was only concerned itself with the consumer as an observer (Koenitz, 2010).

Around the advent of the computer, however, a new branch of Narratology was introduced. With Barthes seminal essay 'The Death of the Author' (Barthes, 1967) and soon after, within digital storytelling, writers invented ways for the audience to also partake in the creation of the narrative, and while people had had interactions with stories before (e.g. impromptu theatre, abstract play, and more recently pen & paper games) this was the first time it came under narratological scrutiny.

This new factor (henceforth named *interactivity*²), gained a lot of attention around the 90's, when works such as 'Hamlet on the Holodeck' (Murray, 1997) reached critical acclaim. Making so-called user-interactive VR-rooms where one could finally become completely 'immersed' with the narrative through interactivity, became popularised. The hypertext systems of the early internet provided an early look at how people could

²Though I realise this term is a lot broader than mere author-interaction

be allowed to interact with a story. There was much talk about consumers becoming the creators and, again, the death of the author (Ryan, 2001, pp. 9-12).

Taming interactivity, however, proved harder than these early interactive narratologists thought. The promise of hypertext-stories deflated through their blatant failure at delivering the end-goal³ (Ryan, 2001). Interactivity, as a narratological device, also came with a very hard problem; The author proved notoriously difficult to kill.

It soon became apparent that, while having the consumer create their own narratives was a nice thought, most users are irrational, inconsistent, do not understand the point, often carries no knowledge of what is proper and intelligent narrative design, and are on all accounts not good at storytelling. Having such horrible team-players try to collaborate with a system whose job it is to make sure that good story is told is an arduous task, and why impromptu theatre is so hard to get right (Aylett, 2000, pp. 4).

1.1.3.1 Issues with Interaction

It can be established that, for the stories in which some specific agency or a specific type of narrative is wanted, there must exist a red thread through the narrative, which should adapt to the audience. Bruni and Baceviciute (2013), write about how an interactive narrative system is required to keep both *closure* (that the audience perceived the story as existing, independently of how close it got to the one intended) and *intelligibility* to a satisfactory degree, at both the system level (the things the audience can do) and narrative level. These are all considered requirements for creating a satisfactory narrative of any kind, and therefore something a narrative must employ⁴.

The author might also have a more specific narrative in mind for the audience; one which might be intended to carry some kind of message, after all, what is a narrative without point or structure? (Aylett, 2000, pp. 2) (Bruni and Baceviciute, 2013, p. 14) This intention might often collide violently with the actions of the audience: The author wants a hero, the audience kills the king on sight; The author wants the story to enter a cave, the audience never finds it, or decides against it. This problem has a dramatic name: *The Narrative Paradox*; the dispute between author and audience intention (Göbel et al., 2009, pp. 2) (Bruni and Baceviciute, 2013, pp. 2). With interactivity, an author needs to decide how much control they want to keep from the audience, in fear that they might destroy the narrative.

³Hypertexts, employ ‘selective interactivity’, in which an author can choose between pre-made options. This is rather short of the absolute creativity the audience was originally promised (Ryan, 2001)

⁴This distinction will feature majorly in later theory, as well as design considerations and tests. Be sure to remember it well.

1.1.4 Combinatorial Explosion and the Interactive Storytelling Field

To solve the narrative paradox, narratologists first attempted fixed choice-based systems. If an author could just write themselves out of everything the audience could do, then the narrative could keep control at all times while the audience could do whatever they want.

The perceptive reader might already have caught on to a problem here: Every time a narrative choice is available to the audience, the author needs to have prepared a multitude of separate paths for them to ‘choose’ this results in a daunting amount of work, which can end up with countless parallel stories with every possible choice; just to allow the audience some semblance of control. This problem is aptly named *Combinatorial Explosion* ([Bruni and Baceviciute, 2013](#); [Aylett, 2000](#)).

While several structures have been presented over the years to control this issue, they all seemingly fall short. Some cannot be scaled easily, some threaten to allow the audience to collapse the narrative structure, some are impossible for a narrator to manage, and yet others only feint interactivity, while being nothing more than branching structures and diversions which ultimately lead back to the same end. They also share the problem that an audience cannot be allowed full control over the narrative, the narrative paradox presents itself, since all of these systems require some form of author control.

For interactivity to exist in its pure, unhindered form, one must allow full control within the environment. One could call it a *sandbox*⁵ with a developing story. A place where the audience can be as inconsistent as they like, as radical as possible, and the environment would adapt and create a proper narrative around it.

In response to these issues, a new academic field has risen. With the promise of ever-more powerful computers and computational algorithms, professors and engineers aim to utilise the methods and structures born from the static field of Narratology, and shape them into algorithms, systems and predictors, which would make a computer able to tell a story on-the-fly, and this way take the players’ actions in that story into account as they happen.

It is called the field of Interactive Narratives (IN) or Interactive Storytelling (IS) ([ICIDS, 2017](#)).

It might come as no surprise that, being a mere 50-or-so years old, we have not come very close to fulfilling this dream.

⁵A term borrowed from games-theory

1.1.5 Reinventing the wheel

17 years ago, [Aylett \(2000\)](#) claimed that creating truly interactive experiences was “*Wishful thinking in the current state-of-the-art of intelligent agents.*” ([Aylett, 2000](#), pp. 4). Since then, several conferences and research communities have evolved into conduits for academia intent on proving that statement wrong. While much has happened for the progress and several prototypes have been presented, some even showing moderate success (One can look to Facade ([Mateas and Stern, 2003](#)), The Moody Mask Model ([Larsen et al., 2015](#)), IDTension ([Szilas, 2003](#)), FearNot! ([Aylett et al., 2005](#)), Aporia ([Bevensee et al., 2012](#)), Emohawk ([Brom et al., 2009](#))), the field is still a long way from its first blockbuster.

With such an immense task still ahead, one can not stress the import of close collaboration and sharing. The creation of consistent research methods and frameworks which researchers and engineers can iterate upon, and methods of development designed to get any project through the parts of the project which are less relevant to the point, as quickly as possible would be essential to accelerating the field as quickly as possible.

This project started as an attempt at helping the Interactive Narrative Research field, not by accelerating collaboration, but by perhaps removing some of the work involved with prototyping.

The most glaring issue I see many of the previously mentioned prototypes having in common besides them belonging to the collected body of IS-research, is that these are placed in highly complex 3D environments fitted with custom-build language generators, path-finding systems, etc. Creating such complex environments is extremely time-and resource consuming⁶ and (while they might fit the certain narrative) removes focus from the work which these researchers set out to do.

It would be beneficial if a development frameworks fitted for interactive narratives was built, so researchers would not need to go to such lengths before getting to the work they set out to do, a possibility which was also requested in the paper ‘Towards minimalism and expressiveness in Interactive Drama’ ([Szilas et al., 2008](#)).

1.1.5.1 The Importance of Specialisation

One might believe that building a graphical platform which adequately conforms to all types of interactive narrative might be a bit beyond the capabilities of this project. And

⁶one can refer to [Aylett et al. \(2005\)](#)’s work for an example of the implications such design-decisions can have. Here, keeping expectations for physical behaviour in a 3D environment, as well as proper navigation was an issue.

one would be right.

Trying to create such a design, which serves all preferences optimally, might also prove methodologically impossible, as it will have to incorporate every possibility this medium should offer into one single design, some of which might prove disastrous to certain narratives. Instead of creating the optimal system to portray a specialised idea, one would create the mediocre system which does everything badly.

Remember again the debate about the narrative paradox in which the author might also have some specific intent with the narrative. There has recently been a few studies which have questioned the approach which much research seem to have taken at the moment. [Bruni and Baceviciute \(2013\)](#) suggests that the narrative paradox can not be “solved” with a general process, which would then be able to create every conceivable narrative. Additionally, just as some narratives require different processes to work completely opposite to other narratives, interactivity itself is also a parameter which can be tweaked. Some narratives might appear best when interactivity is limited, and the player either removed or forced to play along. This treats the narrative paradox as a design-choice rather than a fixed problem, onto which one can choose the size of one’s problem.

Because I am looking to propose a graphical framework, there is little need to also tackle the narrative paradox as well. To lighten the burden I therefore focus on a design which requires little to no interaction from the author.

In the following I propose an expression-form which should be able to create interactivity and authorial intent without the need for time and resource-consuming complex systems.

1.2 On Signs and Abstractions

The hunt for a suitable framework for presenting IS-systems leads first to the classical narratological subject of *semiotics*: The study of signs.

Like Narratology, semiotics has been around since mankind’s infancy, but was formally shaped into its current form around the shift to the 20Th century by Saussure, who first attempted to separate the components of a sign, thereby founding semiotics. As the reader might remember, this was not 50 years before the time when a story was first set apart from its rendering.

Semiotics concerns itself with meaning-making between a sender and a receiver through a medium. This endeavour can take any shape and form (Saussure was a linguist, but simple sign-posts at the roadside fall under this category as well), as anything a person

assigns meaning to is a sign, no matter if a potential sender intended it (Chandler, 1994, pp. 1).

It is Saussure's bad luck that his own dualistic segmentation of meaning has fallen out of favour, and even the combined efforts of later Saussurean semiologists⁷ have managed to address all the criticism which his theories have received (Chandler, 1994, pp. 8-11). This is not to say, though, that Saussure's new field expired (or many other observations he made), as semiotics is still widely relevant to e.g. linguistics.

It was Charles Sanders Peirce who defined the currently accepted model for *Semiosis* (As the study of signs and its internal relations between the individual elements are called).

Pierce's model first defines a *representamen*, which is the form of the sign; A word, a road-sign, or a footprint all serve as representamen as they are what will trigger the interpretation.

Second comes the *object*, the thing which the representamen refers to. The intended meaning where one is, and the actual inference, where no intention was. At last comes the *interpretant*; the sense which one makes of the sign (Chandler, 1994). It is the basis of all misunderstanding that the object and the interpretant is not necessarily the same. That that which was intended was not that which was understood, even if the representamen was perhaps obvious.

This simple model is often, together with its many re-iterations, called a 'semiotic triangle' (figure 1.1).

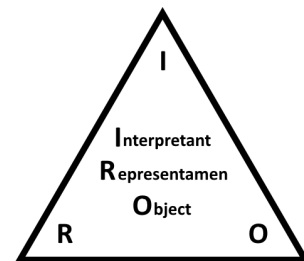


FIGURE 1.1: The semiotic triangle as proposed by Peirce (Chandler, 1994).

Sign categories

Grasping the full implication and possibilities with this triad is perhaps best achieved by looking at the 3 classic categorisations of signs.

First is the *index*: the least arbitrary of the 3. These are marks in the works which we immediately recognise as existing through some cause-and-effect; the signs to which we infer meaning through blind compulsion. Consider the footprint from earlier: A footprint is a mark which was left behind by something which stepped there with a foot.

⁷Semiology is the Saussurean tradition. it is specifically structuralist and should not be confused with Semiotics which it is a part of (Chandler, 1994).

We can perhaps recognise the direction it was headed, how heavy it was and so on. All this information is indexical, as we look at the evidence for its existence.

Second, the *icon*; the in-between. Unlike indexes, an icon is usually placed with intention thereby gaining intended meaning. It represents something in the world by showing an abstract representation of it. Consider the road-sign; specifically those which show small pictures of either cars spraying rocks about, cars driving over cliffs, or animals in flight. All of these signs are iconic because they to some extent attempt to infer their meaning by looking like, their object.

At last, the most abstract sign: the *symbol*. Aptly understood in normal language, its meaning exist only through agreed-upon convention. It is the clearest example of arbitrariness in meaning-making, and the spoken word is a good example. Human spoken language exists only, in reality, as a bunch of sounds stringed together into complex structures. These structures convey no meaning in themselves, though through cultural agreement we are able to relay complex thought and meaning through this otherwise meaningless system with near perfect accuracy. A symbol is a meaning forced upon an otherwise meaningless context. The interpretant relies upon the interpreter being in on the agreed code to get the correct object from the representamen, to a degree not seen in any of the other sign-types (Chandler, 1994, pp. 14-17).

It is perhaps no surprise that Saussure, being a heartened linguist, was very aware of the arbitrary nature of signs and placed great emphasis on it. He believed that signs primarily referred to each other, and that they thereby defined themselves. This manifested into a negative subtracting view where different nominators defined each other by being themselves that which the others were not, and including everything which was not explicitly removed from them by the existence of separate terms. Peirce too described signs as hugely dependent on the beholder, being known to write that “*nothing is a sign unless it is interpreted as a sign*”(Peirce, 1960, pp. 2122), giving way to the idea that anything existing in the actual world is utterly meaningless until we decide to make sense of it (Chandler, 1994, pp. 14-17).

It was this arbitrariness which paved the way for *Ontological Abstraction*.

1.2.1 Ontological Abstraction

One does well to mention, that Saussure did not believe that language was completely abstract. Many different factors plays in for the creation of good language: The string of sounds produced have to be easily distinguishable and some words are combinations of other words which then help shape the new meaning.

At last, Saussure also recognised that for a language to be completely arbitrary it would have to be historically and culturally independent, which it is not (Chandler, 1994, pp. 10). As soon as a word is entered into a linguistic community its potentiality is lost, and the meaning which it conveys becomes actuality. History and culture binds it, and the best it can hope for is to be allowed to gradually change together with its culture, and maybe gain multiple meanings, which could add to its obscurity (Chandler, 1994, pp. 9). It comes naturally, then, that any single person who is part of that culture no longer has influence over the meaning of already existing words. Conventionality has written a code which they are forced to follow if they want to be properly understood (Chandler, 1994, pp. 11).

It can thereby be concluded that the majority of the abstraction allowed for any given sign system is limited to the initial birth of a sign and its gradual change of use over time. It is therefore when a sign is first forged that it is most free, and it would in essence make no difference if black had originally been named white and vice versa. The meaning would have been the same. It is only over time, as the sign is used, that conventionally locks it in place. This form of parallel meaning which is lost when actualised, is named *Ontological Abstraction* (Chandler, 1994, pp. 10).

1.2.2 Short on Apparent Behaviour

Following what is now known of linguistic arbitrariness and the descriptive or agreed upon meaning of signs, it would be interesting to look into another related area from Sociology: *Apparent Behaviour*.

Coined in 1944 by the fundamental paper ‘An Experimental Study of Apparent Behaviour’ (Heider and Simmel, 1944), apparent behaviour is a psychological phenomenon, in which one can take basic shapes such as circles and triangles and through the basic morphing of these, make people associate behaviour and intention to such an extent that people make up whole narratives involving them. Heider and Simmel (1944) themselves showed this with a small movie in which two triangles and a circle were moving about⁸. This seemingly irrational association of higher-end intention and behaviour to simple geometric objects has also been studied in the *perception of causality*, which Albert Michotte is known to have founded with his book ‘The Perception of Causality’ (Michotte, 1963). His field concerns the basic components, which Heider and Simmel (1944) uses for their narrative, perceived as basic cause-and-effect behaviours to an irresistible degree.

⁸A remake of this movie can be seen in Heider and Simmel (2013)

What is puzzling is that this inherently symbolic and iconic interpretation seem to produce a wild variety of narratives. In [Heider and Simmel \(1944\)](#), participants saw inanimate beings moving about, lovers fighting over a girl, or even birds flying about.

This appearance of explicit story creation in a non-explicit environment has also been found in video games more recently, in an attempt at solving the narrative paradox ([Ryan et al., 2015](#)). Henry Jenkins found that if a player is left in an environment where objects are strewn about in a causal manner, then some players start putting together the state of these objects - creating causal links between them until finally creating a narrative about the story of said objects, much akin to how a detective would dissect a murder scene ([Jenkins, 2004](#)). Likewise, Ruth Aylett found that if the audience is left with a set of characters which each serve as actors, then they they construct narratives around the interactions between the characters and themselves. She named this phenomenon *emergent narratives* ([Aylett, 1999, 2000](#)).

1.2.2.1 A Take on the Apparent Behaviour Rationale

Ever since the coinage of Apparent Behaviour and the Perception of Causality, a small community of researchers within psychology and sociology have been fleshing out the ways to make these abstract behaviours be perceived in a more reliable way. The field has made steady progress, however, none of the proposed work which I am aware of, has provided reflections on the nature or cause of these apparent behaviour states since [Heider and Simmel \(1944\)](#). So far, works have only focused on the reason for why basis behaviours are perceived at all (why is something a hit, when is it passing through. Is it higher-cognition or part of a physical reactionary system?). I believe that this is an unfortunate oversight within the field, and that apparent behaviour would benefit from being thought of in more psychological and narratological terms.

[Heider and Simmel \(1944\)](#) themselves requested the inclusion of the study of relational judgement and the reasoning behind judgement rather than the intended ‘correctness of judgement’ the field had so far limited itself to. It would be safe to say that if sign-theory is truly so fundamental to apparent behaviour, then it would be folly to focus exclusively on enforcing a certain interpretation and not work on understanding how and why these interpretations appear in the first place.

To me, part why such diverse stories are perceived might be broached in sign-theory and Saussure’s theory about the inter-connectivity of signs. Remember that Saussure believed that every sign referred primarily to the other signs in the same system, and were described best by being what the others were not.

The basic objects occupying the space in [Heider and Simmel \(1944\)](#)’s movie are highly abstract constructs for the complex characters people are reported to take them for. What more, the intrinsic movement structure and basic setting has not been detailed to participants beforehand, and there has been no indoctrination as to what different symbolic movements mean beyond their indexical meaning. People who look upon this highly abstract piece will therefore be forced to familiarise themselves with the language and make assumptions as to the meaning of different signs one at a time on-the-fly. It would come as no surprise if people borrow meaning from familiar signs in systems they have previous relations to. This would also explain why people can find complex behaviour in such simple scenes without having learned the language beforehand. If this was not the case and Saussure’s subtraction theory assumption is to be correct, then there would be no interpretation since the first sign would mean everything and thereby nothing. Carrying the history and culture of that system into this new context, and superimposing any system into it. This would make any story which appears from such a system highly context-dependent to the audience. One might go as far as to talk about a personal story, when no context is given in such an abstract work.

This “personal interpretation-theory” goes well with recent theory in emergent narratives and IN-research. Recall the dispute between the author and the audience in the narrative paradox. [Bruni and Baceviciute \(2013\)](#) Describes a concept named Author-Audience Distance (AAD), which proposes that the more abstract a narrative becomes, the more room there is for the interpretation of it (figure 1.2). There might be a point where the narrative becomes completely unintelligible, and the author’s intention with the narrative is lost. This would be the perfect sandbox; The narrative created wholly by the audience, and while perfection in that regard might be undesirable in some cases⁹, I believe that by genius or mistake, [Heider and Simmel \(1944\)](#) have stumbled upon a close-to-perfect version of abstracting a narrative.

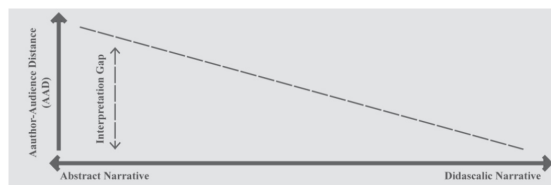


FIGURE 1.2: Author-Audience Distance, as it is visualised in [Bruni and Baceviciute \(2013\)](#). The less didascalical (obvious, self-explanatory) a narrative is the more the audience has to interpret themselves, and the more room for swaying from the original intention is allowed.

When we attend museums which portray highly abstract works of art one will usually find guests in contemplation about the expression intended by the artist. There will usually also be a multitude of different suggestions as to what the work is supposed to

⁹as discussed in [1.1.5.1 The Importance of Specialisation](#)

mean. If something as simple as a static painting can be so deluding, imagine then the variety in expression provoked by such a painting also performing in time.

1.2.3 Apparent Behaviour as IN-Generation

Given the resources provided to this project, it is not feasible to develop flexible high-detail environment following the trend of voice-synthesising, language generation, and complex 3D-environments which IN systems are prone to be coated in today (Aylett et al., 2005; Mateas and Stern, 2003; Szilas, 2003; Bevensee et al., 2012; Brom et al., 2009).

aiming towards a simpler interface would perhaps also serve as a demonstration of the power and capabilities such minimalist approaches can have in environments where the story is supposed to take focus. It is my hope that a successful implementation of a framework might start other researchers down the path of story-focused - not visual or linguistic focused - generation.

1.2.4 The Challenges of Apparent Behaviour

Implementing Interactive Narratives in an apparent behaviour setting is going to be a challenge, though. The concept is perhaps a bit too minimalist, since the simplest stories, can be interpreted in such a wide variety of ways.

To learn more on this issue I return to the topic of semiotics; more specifically to the work of Wolfgang Iser and Meir Sternberg. Within their analysis of the possibilities of plot, narration of discourse, it was made a point to demonstrate that a narrative gains its purpose and flavour by all of the things which has been told, but also by all the things which were not. Every detail which the reader has not been made privy to may change the way the reader ultimately judges the situation in the story, many stories intentionally leave out information to make a reader judge the situation in some light only to feed it to them later and completely change the interpretation. This ‘opening and closing of gaps’ is at the heart of much writing, and a fundamental component in narrative discourse.(Abbott, 2007, pp. 44-45)

Imagine now a story in which every possible influential colouring has been removed. The only information we attain in this narrative is the base dance of geographic objects onto which we impose some story, some intentionality. This would be the ultimate gap-creation; The total removal of colour from the narrative. The appreciator comes in with their real-world palette of impressions and immediately goes to work deciding who is

the villain, who is the hero, who is in distress, and what the motivations behind each action is. AAD would be doing all the work.

1.3 The General Goal of This Endeavour

The goal of this project is to build an example application of an interactive narrative, which has been created through apparent behaviour. In an attempt to allow the system some form of intelligibility, I then attempt to tame the narrative closure to a certain degree where the fluctuations are limited to a wanted level of abstraction. Notice that this proposes a bottom-up approach to the design of the story: The design starts completely abstract, and is then limited to a degree where a specific narrative should spring from it.

When the abstraction can be seen as a rough boulder from which a narrative can be loosely chiselled, apparent behaviour might also encourage the audience to close lesser inconsistencies and unintentional gaps in the narrative. Having a tool which closes smaller discrepancies might help make apparent behaviour desirable as a tool for some struggling AI structures — potentially serving as ‘training-wheels’ for less competent systems — which was, ultimately, the goal.

Part II of this report describes how apparent behaviour is used for the development of an application which defines a simple narrative. The goal is to have his narrative properly conveyed to an audience, which then fills in the details.

Chapter 2

Means

Having properly defined the goal of this project as the use of Apparent Behaviour within IN-design, it would be beneficial to understand better the current state of the art, as well as what other topics might be related. In this chapter, a proper evaluation of apparent behaviour, perception of causality, and emergent narratives is therefore given.

To properly convey a narrative in the IN-application designed in part II, as well as evaluating how well that narrative was mediated in part III; intelligibility also has a section here: How other abstract mediums bind meaning into interpretative works, and how one could go about testing how well it performs.

At last, before the application is developed and tested, the specific goal of both will have to be defined. This chapter therefore finishes with a final problem statement.

2.1 On Apparent Behaviour

Apparent Behaviour was proposed in 1944 by the researchers Fritz Heider and Marianne Simmel ([Wagoner, 2011](#)) as a sort of precursor to the perception of causality.

They showed a short movie to participants in which triangles and circles moved around in- and outside a hollow box (figure [2.1](#)). The study was attempting to determine the perception of phenomenal movement and it's precursors. They found that participants attributed origin influences on the shapes as intentional behaviour ([Wagoner, 2011](#); [Heider and Simmel, 1944](#)), some even to the point where they constructed loose narratives around the phenomena they perceived¹.

¹These narratives were by no means consistent, however, and the level of abstraction varied greatly. In [2.3](#), work at attempting to stabilise this perception will be detailed

Despite the field's relevance to Narratology, apparent behaviour has experienced little progress since its inception ².

To my knowledge, it is only recently, with the increasing competence of perception of causality research, that studies such as [Scholl and Tremoulet \(2000\)](#) and [Gao et al. \(2010\)](#) have really broached the subject, however, never advancing it to the point of creating a purposeful narrative.

With this lack of apparent behaviour-specific research, I am best served to focus attention on perception of causality research too, given that the two are highly related.

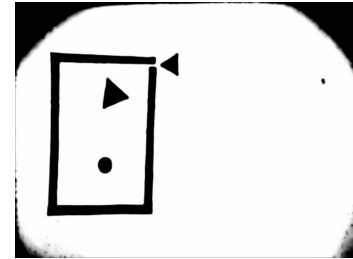


FIGURE 2.1: A screenshot of Heider and Simmel's original movie in which a small circle, a big triangle and a small triangle move around and inside a box. (Source [Heider and Simmel \(2013\)](#))

2.1.1 Perception of Causality

Founded as a term shortly after apparent behaviour by Albert Michotte's fundamental book 'The Perception of Causality' ([Michotte, 1963](#); [Newman et al., 2008](#)).

He found that when abstract object moves based on certain kinetic and temporal rules, people has a tendency to interpret one movement as causing the other. These rules then determine whether people see causality between objects' movements such as hitting, dragging, launching etc. or they see unrelated movement ([Choi and Scholl, 2004](#); [Beasley, 1968](#); [Newman et al., 2008](#))

Like any newly created field, the work presented from Michotte's book has been criticised. The accuracy of his results has been questioned and his lack of published data criticised ([Beasley, 1968](#); [Kruschke and Fragassi, 1996](#); [Hubbard, 2004](#)). Yet promise of his theory has shown through the obvious perseverance of the phenomenon. There has been no shortage of people who would criticise the accuracy of his work, yet none have disputed it.

²(And the sparse research which has been made has been hard to find, given that each researcher seem to have their own name for various alterations of the phenomenon. e.g. 'intentionality', 'goal directedness', 'social causality', or 'social meaning' as [Gao et al. \(2010\)](#) found that some had called their own 'perception of animacy')

As a result, there has also been steady progress in fleshing out the phenomenon, and while a lot of this research has concerned the intrinsic reason for this phenomenon's existence³, with regards to functional tools the field has expanded from single-object direct interactions (Michotte, 1963), to include rules for temporal disparity, spatial disparity (Scholl and Tremoulet, 2000), grouping (Choi and Scholl, 2004), traction (White and Milne, 1997), and later more intentional features such as focus, stalking, and chasing (Gao et al., 2010; Gao and Scholl, 2011).

The perceptive reader might have noticed that much perception of causality-research seem to follow the same style as Heider and Simmel (1944). Both concern people's perception of behaviours which are technically non-existent in the environment. A circle never does transfer any force to the neighbour object, and it has no actual intention when launching swiftly towards another. This similarity can also be seen in the research. Heider and Simmel (1944) seem to ascribe some relation, using the yet undefined perception of causality as a lower layer for the systematic analysis of their phenomenon: *"In order to begin our analysis we shall have to describe the stimulus-configuration and then to make clear the term 'hitting.' The stimulus consists of coordinated movements..."* (Heider and Simmel, 1944), one of Michotte's 19 original causalities was the auto-locomotion or 'Animal Locomotion' effect, in which the object caused its own movement (animacy) (White and Milne, 1997). Likewise, apparent behaviour has been mentioned in other recent perception of causality research (as 'perception of animacy') (Gao et al., 2010).

2.1.2 The Perception of Causality Toolbox

Given the rather lacking state of current apparent behaviour research, the more well-developed state of perception of causality-research (as is demonstrated in 3), and the highly connected nature of these two fields; I will, for the rest of this report, approach perception of causality as a sort of 'toolbox' for apparent behaviour. Any lower-level causality devices can be combined into a coherent and contextual whole which could produce apparent behaviour. Falling back on the argument for apparent behaviour as a substitute for story generation (or indeed, plot, by some definitions), perception of causality provides the basic signs and would thereby constitute the discourse

In 3, a list of perception of causality devices are found and described to build a set of behaviours for the application.

³Much research here has argued for the placement of this perceived causality within in the perceptual system. It seems to act as high-cognition, while the irresistibility, immediacy and universality across age and culture suggests otherwise. (Heider and Simmel, 1944; Scholl and Tremoulet, 2000; Gao and Scholl, 2011; Choi and Scholl, 2004; Newman et al., 2008)

2.2 On Emergent Narrative

There exist one topic within IN research which seem eerily similar to apparent behaviour in its implementation. In this section I will be giving this its due.

Emergent Narrative, details the narrative which appears from the audience's own mind, when they interpret the environment and character behaviour around them as a story.

It was originally proposed by Ruth Aylett as a purist method for solving the narrative paradox: A system in which the characters and environment would create the story as the audience went along, making them participants in the story rather than observers (Aylett et al., 2005). Building such an expressive approach, where the story structure is made as a sort of take-it-as-you-go-storytelling, requires looking upon narrative structure as button-up rather than top-down (as many have a tendency to). The plot would present itself as a product of the interactions, as they happen in sequence, and thereby create story without being limited by author intention (Aylett, 1999, 2000; Aylett and Louchart, 2003).

While multiple examples of this phenomenon are known to exist⁴ the problems with this approach are also many. The need for a sufficient amount of dynamic choices and combinations (Aylett, 2000) being the least of them. First, without proper structure there could be no end to the story which is produced (Aylett et al., 2005) (this also relates to Bruni and Baceviciute (2013)'s theory of closure), the story might not even be that good (Aylett, 2000; Brom et al., 2009). Second, the story might not emerge at all, either the application is stuck in an uninteresting loop or the audience does not interpret it (Aylett et al., 2005) (A forgivable oversight considering none is actually there, and also a problem apparent behaviour struggles with).

Aylett herself admits that some high-level structure might be necessary (Aylett et al., 2005), though perhaps not through the typical author AI. This also shows in some of her later work, where promising results were reported (Louchart and Aylett, 2003).

2.2.1 Useless

With its promise of a narrative-as-you-go structure, and possibility for abstract and discreet (hinting) storytelling, emergent narrative-research provides a de facto example of the apparent behaviour mindset in action within IN-research.

⁴see football and other collaborative games (Aylett, 1999), free-improvisational theater (Aylett, 2000), the environmental storytelling approach from 'Aporia' (Bevensee et al., 2012)

The way emergent narratives provides its own structure and goals for the audience, where none are, is reminiscent of how apparent behaviour seem to be able to produce a narrative out of simple shapes.

If one wanted to create the purest interactive narrative, one might consider combining the two, the audience not only creating its own narrative, but also having to recognise and build their own meaning as they go. At this point there would probably be little left other than the uncontrolled imagination of the audience, and it would therefore serve as little more than an inspirational anchor.

The next section will concern how this is avoided in the apparent behaviour through the consideration of intelligibility.

2.3 On Intelligibility

There has been a common theme throughout the different theories I have visited so far. Whether looking at semiotics and its ontologically abstractions, apparent behaviour with its large AAD, or emergent narratives with its non-obvious narrative structures, all share the uncertainty of their object being correctly perceived. Of all the theories visited, apparent behaviour is perhaps also the most dubious one. [Heider and Simmel \(1944\)](#) encountered several participants who had little to no interpretation of the narrative, and that was after ignoring the issue with accurate understanding of author intention.

Given that the author intention owns some role within this project's application, intelligibility becomes a key issue: How can one stabilise the narrative to give some level of authorial intent, and can it be known that this was actually perceived.

In this section I address both of these issues, by first addressing the authorial intent which the application is supposed to mediate, how best to do it, and how its success should be evaluated.

2.3.1 Increasing intelligibility

There are, in essence, two approaches one can take when increasing intelligibility within abstract works: One can work on making the message more clear inside the work, letting the work tell the story, or one can tell the story around it, making sure that the audience understands the message.

One obvious way to increase intelligibility in apparent behaviour without having to explain anything would perhaps be to include less arbitrary elements: Insert known

cultural cues, etc. With every non-abstract sign that gets added to the application, the AAD is lowered. First, the audience loses their ability to freely interpret a shape's characteristics, second they lose their ability to choose its role. This follows the logic of the negative order of signs and ontological abstraction ([Chandler, 1994](#), p. 6) which was visited in section [1.2](#).

The second approach: the 'slap-on narrative' is more disruptive if used within the application. It might remove the intent more from the application's own discourse, though. It can take the form of a book reference, a movie, a text, a back-story or similar, and is a relatively cheap way to introduce a narrative quickly. An example of this is the flying text-sequences which usually disrupt abstract Hollywood montages: The *Copy and Narration* procedure ([Garrett, 2012](#)). While an acquired taste to some, these sequences are usually able to, very accurately, display what the movie is about in a few broad strokes.

While both of these options seem equally sufficient at solving the problem at hand, the 'slap on' approach requires significantly fewer resources, and given the fact that this project is already building a apparent behaviour application from scratch, it would perhaps fit best to leave the sign-language out as much as possible⁵, and keep to a purist design. Further work will then be able to compare their success with mine.

This results in the project now needing to find a text which can 'inject' narrative meaning into the application. building a loose framework for a story which the audience is then free to work within the confines of. How this is done is detailed in [4.2.2](#).

2.3.2 Measuring Intelligibility

Having decided on the method for which intelligibility is to be introduced and closure controlled, the rest of this section will detail how to measure the degree of its success.

2.3.2.1 Subjective and quantitative measurement approaches

Given that intelligibility is an ordinary word in the English vocabulary, and it describes such a basic function in human cognition, it is no wonder that it has been used outside of narratological abstraction.

Most closely related to narratology, however, is sociolinguistics, where intelligibility is used to measure proficiency in a language. For this, the Recorded Text Testing (RTT)

⁵As finding and stabilising a symbolic language seems a significant amount of work, which also works against the goal of our framework.

method is usually used, in which subjects are given a range of possible answers to answer each piece of text. These answers are pre-graded, and intelligibility is thus recorded quantitatively. There is a series of problems with this method, though: Despite the usual obvious problems which involve guesswork and triangulation, the accuracy of the test is also heavily dependent on the accuracy of the answers. While this might be obvious, it is no trifle matter in one language, and increases in complexity when the test-designers might not know the second. (Gooskens, 2013; Kluge, 2007)

To alleviate these issues, Kluge (2007) proposed an alternative method: The Recorded Text Testing-Retelling (RTT-Retelling) method.

In this, the subjects would write small paragraphs explaining what was said in their own words, in the foreign language or their own. This would remove the guessing, triangulation issues and allow much greater accuracy of the answers, however, the test-designers would now have the monumental task of accurately grading each answer (Kluge, 2007).

Unfortunately, both of the current major versions of the RTT model have either methodological or management issues (Kluge, 2007) beyond what can be considered feasible for this project. Additionally, this kind of evaluation is perhaps best tailored to highly purposeful texts, where everything is supposed to be highly didascallic⁶.

While there is no doubt that it would be beneficial to record the specific narratives my audience experiences and evaluate these, there should be a more quantitative approach to how well they understood any narrative at all.

2.3.2.2 A Narratological Approach

One who wants to find a quantitative measure for the intelligibility of a system might want to then turn to Narratology and Interactive Narratology. Is it not, after all, the field concerned with the analysis of story, and the inventors of the didascallic scales as well as the AAD concept and closure systems we have previously visited? It is a great irony for the field that it concerns itself primarily with this and that I at the same time have been completely unable to find any specific case-studies in which intelligibility and closure has been approached in a scientific manner. I will therefore have to approximate such a method from scratch.

⁶While research has been put into transferring these methods into other regions such as sign-language (Kluge, 2007), it has so far kept to didascallic methods.

Given the dubious nature of apparent behaviour, and the fact that some level of closure is wanted in the application, it is perhaps best to start by looking at whether story is perceived at all. Given that what narrative was perceived is already broached in RTT-retelling and their qualitative methods, I limit the search to a system which can measure what level of narrative (the level of closure) is experienced. Remember that [Beasley \(1968\)](#) has such troubles making causality work at all.

Fortunately others have thought of the layered nature of narrative before. [Aylett \(1999\)](#) approached it in her work on Emergent Narrative. Remember that narrative was there a bottom-up approach, which means that it would be layered. A loose suggestion to such a structure was also given:

1. Overall plot
2. Character-level abstract action sequences
3. Physical behaviour - cognitively determined
4. Physical behaviour - reactively determined

Now, to some this might seem as a reification⁷. Narratologists can not even seem agree to what a narrative really needs, after all ([Ryan, 2006](#)).

A more precise suggestion comes from Marie-Laure Ryan's book 'Avatars of story' ([Ryan, 2006](#)). Here she suggests narrative as a scalar property where 8 requirements are made.

Ryan put up 4 dimensions of narrativity: the *spatial*, the *temporal*, the *mental*, and the *formal* dimensions. She argues that these dimensions are requirements which together make a narrative possible. Once one has decided which layers are necessary for a narrative to exist, a narrative can not exist without those layers. Each of these requirements can therefore be seen as preventing some feature which would make the text into a non-narrative. Additionally, which of these requirements are important would be up to the situation as well as the analyser. One can treat these levels as a choose-your-own system, where one could stop at the point on the ladder one thinks sufficient. The dimensions are as follows.

- Spatial dimension

- 1 **Narrative must be about a world populated by individuated existents:** Defines that specific objects must exist in a world. These objects must be specific, and can not just be something like 'the human race'.

⁷A phenomenon where taxonomies are placed upon a concept to describe it, and the taxonomy 'takes over the meaning' and starts limiting the thing it was meant to describe ([Nickerson, 1998](#)).

- Temporal dimension

2 **This world must be situated in time and undergo significant transformations:** We are not allowed to have a world with objects in it, in which no change exists. Story must concern change. A cooking recipe would not suffice, as nothing changes in the text.

3 **The transformations must be caused by nonhabitual physical events:** The world can not have a couple things move around in the same pattern all the time. The changes must be non-trivial (this also concerns automatic changes such as ageing). This is where the perception of causality operates.

- Mental dimension

4 **Some of the participants in the events must be intelligent agents who have a mental life and react emotionally to the states of the world:** If no sentience exists we are merely observing physical behaviours in an obvious system.

5 **Some of the events must be purposeful actions by these agents, motivated by identifiable goals and plans:** The changes made by the intelligent creatures must actually be made, and purposefully too. Here, stories made exclusively of internal mental monologue inside the head of a character is ruled out. We here approach the extent of what [Choi and Scholl \(2004\)](#) called ‘perception of animacy’

- Formal and pragmatic dimension

6 **The sequence of events must form a unified causal chain and lead to closure:** Here we return to the narrative events and general plot-theory we approached before. A story must include a chronological fabula, which is told through a string of coherent and distinguishable events.

7 **The occurrence of at least some of the events must be asserted as fact for the story world:** A world which “maybe exists” but in which nothing that was described actually ended up existing or happening, is excluded (e.g. internal monologue).

8 **The story must communicate something meaningful to the recipient:** A story must have a point. If there is no higher meaning, message, intention or otherwise, then the story might as well not exist. Notice how this collides with the completely non-intentional sandboxes which Interactive Narrative-research has become so infatuated with. I will leave it up to others to have the debate on whether the research into such applications can actually be called interactive ‘storytelling’ at all.

(Ryan, 2006)

Notice how, even though Ryan writes of these requirements in a non-structured way, each dimension has still been placed nicely on top of the former. Indeed, Ryan herself writes about these requirements as been in a ‘scalar property’ (Ryan, 2006). If one was to set up a test where the audience would give their impression on the presence of each of these ‘layers’ one could create a scale 1-9 on how intelligible the presence of a story is without having to define ‘a story’ to the audience.

This way, Ryan’s structure would be able to measure the level of closure an audience perceived in **any** story.

Remember, however, how the specific narrative is up to the audience, and they will have to be collected through qualitative measures.

2.4 On the Specific Goal of this Endeavour

In this part, the general goal of this project was described as creating an IN-application which uses apparent behaviour and perception of causality as a base for its discourse, to provide a de facto example of apparent behaviour’s use as a discursal framework within IN-research.

Given the highly abstract nature of apparent behaviour, and its instability at providing meaningful discourse, this part also proposed a method for measuring the perceived level of closure, and evaluating the intelligibility. With regards to providing any sort of intelligibility within the application, the ‘copy and narration’ approach from Hollywood movies is employed.

The goal for part II is to provide a design for this project’s application, and for part II to evaluate its ability to provide closure and intelligibility.

The final problem statement for this project then becomes: *“How can Apparent Behaviour be used in an interactive narrative context, where a story is interpreted with a general level of intelligibility towards the author’s intention?”*

The rest of this thesis will concern the exemplification and testing of the success of such as system. Part II defines perception of causality devices, and the design of an application, which is then tested for closure and intelligibility in part III. In part IV I conclude on the project’s success as a whole.

Part II

In Practice

Intro

Having defined the goal for this project in part I, this part defines and describes an IN-application with which will attempt to use apparent behaviour⁸ to produce discourse⁹.

First, current perception of causality-research is visited (for, as has been established, perception of causality can be viewed as a ‘toolbox’ for apparent behaviour¹⁰) in order to establish the rules with which an application can be designed.

Second, the Fabula which forms the framework upon which the design is built. Which narrative and the depth of intelligibility expected of the audience is all described here.

Finally, the design and implementation of the interactive application will be described in detail.

Part III will then describe the evaluation of this application.

⁸An a phenomenon where people ascribe narratives to simple shapes and interactions. See section [1.2.2](#)

⁹The way a story is told. See section [1.1](#)

¹⁰See section [2.1.1](#)

Chapter 3

A Catalogue of Causal Relations

As mentioned in [2.1](#), a good amount of research has been established within perception of causality research since Michotte’s seminal book ([Scholl and Tremoulet, 2000](#)).

The basic concepts of causality are first described, after which more factors will be added. More complex concepts are then gradually introduced until reaching and finishing with what can be described as basic apparent behaviour features.

3.1 Discrete movement

It all starts with Michotte’s work. While the accuracy of many of his tests has been debated ([Beasley, 1968](#)), he is still cited prominently for his original 19 relations. [Scholl and Tremoulet \(2000\)](#) summed up some of the most prominent (figure [3.1](#)).

Launching : The first and most famous effect. A ball (A) approaches another non-moving ball (B) with some speed. When ball A meets the edge of the still ball B, ball A immediately stops and ball B starts moving away from the ball A with the same speed ball A used to have. This creates the illusion that A ‘pushed’ B, and transferred the energy. The other effects are almost exclusively variations of this effect.

Entrailing : This happens when, instead of stopping, ball A keeps moving at the same speed ball B accelerates. This produces a carrying effect, where ball B is being ‘taken’ by ball A.

Gaps : Michotte also showed that our perceptual system is sometimes quite insistent upon assuming causality, even when the objects do not model real-world physics. When

he introduced temporal gaps between ball A stopping and ball B accelerating, people still saw causality up to some threshold. This phenomenon also held true for spatial dimensions. Some saw causality when the correct physics were modelled, but the balls never touched.

Triggering : When messing with the force-relations between the balls, however, people’s perception changes. When ball A accelerates with a greater speed than ball B originally carried, people see ball B as already containing some independent force, which is released when the ball A hits.

Tool effect : At last, [Scholl and Tremoulet \(2000\)](#) also mentions Michotte approaching a multi-transfer of forces. If a third ball (C) is lying between ball A and B, and ball A hits it with a launching effect, after which Ball C does the same for B, then ball C will be viewed as a ‘tool’ through which ball A is transferring its energy to ball B.



FIGURE 3.1: Some of the causal relations between 2 or 3 objects by Michotte. (Original: [Scholl and Tremoulet \(2000\)](#))

3.1.1 Causal Passing

Controversial to the persistence of the spatial gap previously observed, people do not seem to accept it when ball A overshoots. Choi and Scholl (2004) found that if ball A overlaps ball B before ball B moves, then no causal connection is observed. And the two movements do not seem connected. They called this phenomenon ‘Causal Passing’ (figure 3.2).

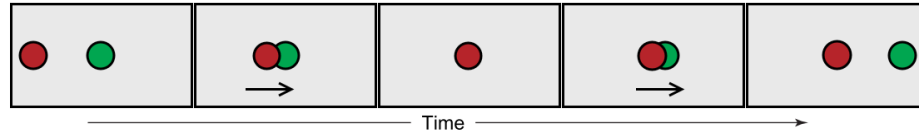


FIGURE 3.2: The causal passing effect, where the acceleration of the still ball is seen as independent to the approaching ball because of the physical overlap. (Original: Choi and Scholl (2004))

This effect was also observed by Mitroff et al. (2005) in a cognition-related experiment for the OP model. They named the effect ‘bouncing vs streaming’ (figure 3.3).

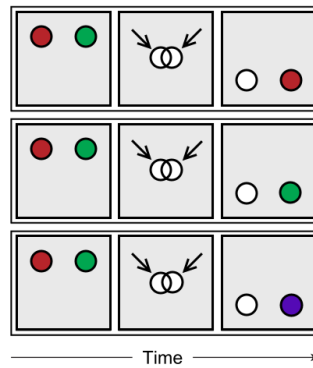


FIGURE 3.3: The three ‘matches’ which can appear when two balls approach each other: They can stream through, bounce off each other, or a third object can appear from it. (Original: (Mitroff et al., 2005, pp. 73))

3.2 Grouping

Having explored the intrinsic nature of single-interaction causation, this section describes the effect these interactions can have on each other. First interactions' interference with each other is described, after which the traditional interactions where objects are seen as being grouped together, is covered.

3.2.1 Causal Capture

‘Causal Capture’, as demonstrated by [Choi and Scholl \(2004\)](#); [Scholl and Nakayama \(2002\)](#) shows how different phenomena can affect how each is interpreted. The specific example (figure 3.4) demonstrates how showing the launching effect next to the passing effect when they are spatiotemporally synchronised, makes the passing effect seem as if it is a launching effect, however, weakens the launching effect. The causes and features of this effect is still largely a mystery, however, [Choi and Scholl \(2004\)](#) seemed to attribute part of it to attention. If one was focusing on the passing effect the launching object would be weakened, and vice verse. This reverse version where the causal link seem to be weakened is called ‘Reverse Causal Capture’. The problem with correctly identifying the origin of an action was something [Heider and Simmel \(1944\)](#) also recognised.

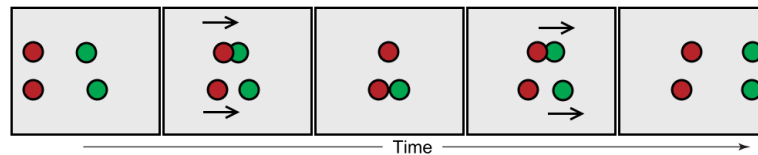


FIGURE 3.4: If participants focus on the passing action on top, then the launching causality is weakened. This they focus on the launching effect at the bottom, then the passing effect is also seem as a launching effect. (Original: [Choi and Scholl \(2004\)](#))

3.2.2 Basic Grouping

Grouping several objects together spatiotemporally and having them do a movement which should not have caused as causal link, can also create a causal link for the whole group. [Choi and Scholl \(2004\)](#) showed how a group of objects, where the bottom object performs a passing effect with a separate object, was viewed as launching by up to half of their participants when the other objects in the group mirrored the still object's movement (figure 3.5).

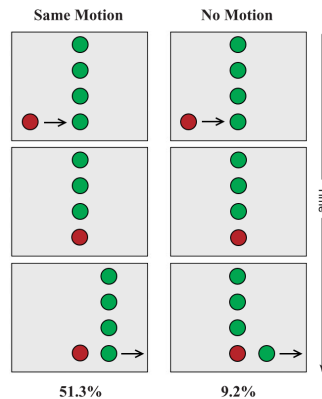


FIGURE 3.5: When all of the green objects moved, during the passing effect, a bit over half of the participants saw a launching effect. This was not the case when only one object moved. (Original: [Choi and Scholl \(2004\)](#))

3.2.3 Pulling and Bursting

As a chance-result from otherwise launching-focused work, [White and Milne \(1997\)](#) found that if two or objects stood still and then started moving in the same direction at different points in time, then the objects which moved first would be observed as pulling the other (figure 3.6). The effect could be observed not only from objects in all sorts of positions, but also in groups of all sizes. Controversially, though, if the starting object would suddenly change direction (e.g. go back the way it came) and the others follow, then this new movement would be seen as each object hitting and bouncing off some invisible object individually.

Two years later, [White and Milne \(1999\)](#) had found yet more group-related effects. The ‘enforced disintegration’ effect (figure 3.6) shows how a large object can be seen as destroying an object group but moving into it, after which the group’s members move in all directions (in their experiment limited to a 120-degree arc).

White and Milne (1999) also found that if a thin object moves into a group of objects, after which the group's objects all accelerate away from the group's centre, then the approaching object can be seen as if bursting the group, and having released some inner force/tension which caused the explosion. Notice how this seem very similar to the triggering effect observed by Michotte (1963).

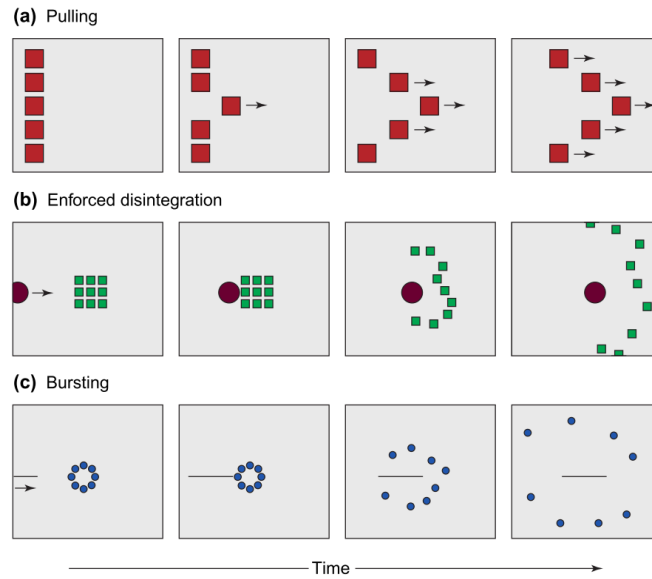


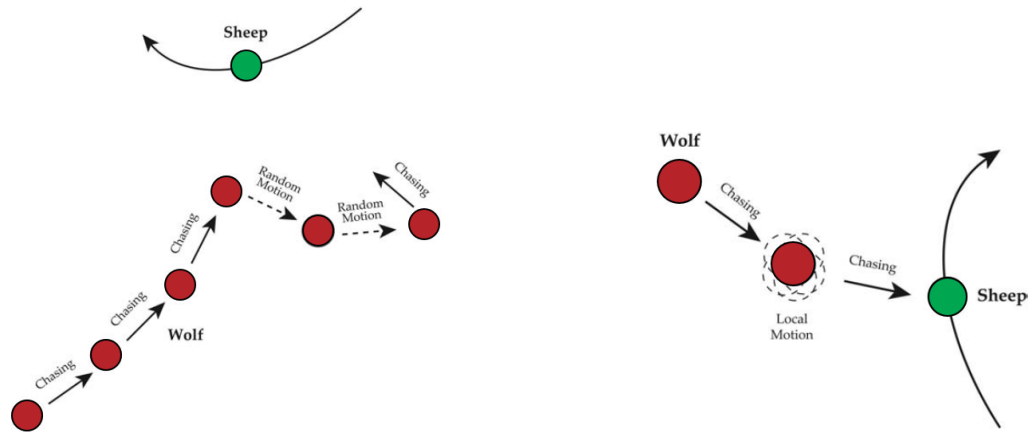
FIGURE 3.6: Three grouping effects, in which an obejct can be seen as affecting a group of objects. It can either pull then, disintegrate the group, or “burst the bubble”.
(Original: Scholl and Tremoulet (2000))

3.3 Animacy

Not all research dedicated to the inner workings of the perception of causality has kept strictly to physical behaviour, though. A string of recent research has started bridging the gap between the strictly causal relations of perception of causality and the agency and intentionality of apparent behaviour.

To start from the beginning (though this review will by no means be comprehensive), the topic was first broached as a study in the difference between chasing and stalking. Gao et al. (2009) Found that if objects which have to move into another object move in a non-straight line towards the target (i.e. it may be moving in a large arc) then people do not perceive the objects as targeting it (figure 3.7a). Later, Gao and Scholl (2011) found that small local movement was ignored (figure 3.7b).

If, however, the chasing objects are shaped in a way that they can point towards their target, then the chasing phenomenon is more robust. Much ambiguity is needed in their movement before the audience no longer perceive the objects as chasing the target.



(A) The chasing effect. Chasing is perceived when the wolf steers straight. The detour will throw people off.

(B) Small local movement will not affect the chasing effect, and the effect is bound by the same rules as in A.

FIGURE 3.7: Original (A+B): [Gao and Scholl \(2011\)](#)

3.3.1 The Wolfpack Effect

[Gao et al. \(2010\)](#) continued research on this, by looking at distracting objects around the ‘wolf’ and the ‘sheep’ (as the chaser and the target were named). Named ‘The Wolfpack Effect’, a group of objects which point towards a target while moving will be seen as chasing that object. This effect is so strong that it can triumph actual chasing. If the group of objects look towards an irrelevant object, participants had a hard time figuring out if some of the objects were actually chasing the sheep (figure 3.8). This effect was independent to the shape of the direction. Both wolves represented as arrows and wolves consisting of circles with eyes were tested with no observable difference. [Buren et al. \(2016\)](#) later found that a group of objects creating this Wolfpack Effect was heavily dependent on the group correctly and consistently targeting an object. The effect was never seen without it.

It is perhaps no surprise that [Gao et al. \(2010\)](#) subsequently found that objects’ direction could influence attention (figure 3.9). When every object was focusing on the wolf’s target, participants could not find the wolf, even if it was drastically different than all other objects. On the other hand, if all objects were targeting the wolf, then participants easily identified it.

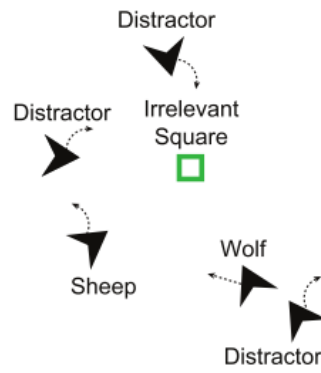


FIGURE 3.8: The Wolfpack effect in which all objects look towards some irrelevant point. The wolf is very hard to find in this context, and will easily catch the player (the sheep). (Source: [Gao et al. \(2010\)](#))

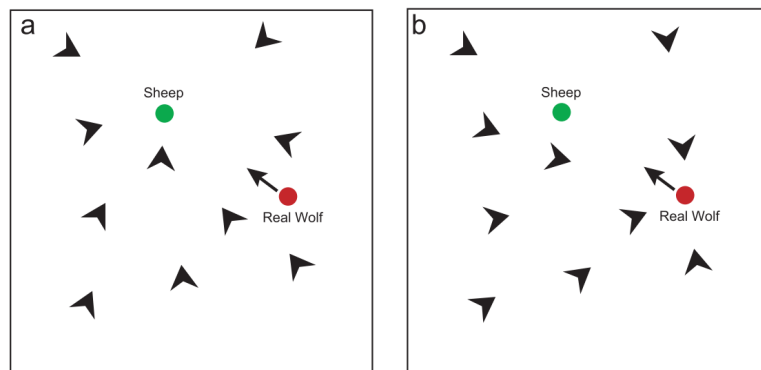


FIGURE 3.9: A demonstration of actors leading attention towards either (a) the player to confusing them, or (b) the wolf to rat it out. (Source: [Gao et al. \(2010\)](#))

Sum-up

In this chapter, a catalogue for the specific devices current perception of causality research has established, was ordered and presented.

The reader should now have an understanding of the most relevant functions which the apparent behaviour-design relies upon in this project's application (Especially the Wolfpack Effect and chasing theory is pivotal to understand).

The following chapter will detail the rest of the background important to understand before the project's application's design is detailed.

Chapter 4

Story

As established in [2.4](#), the application is not wholly an abstract work. Part of this project’s purpose is to show apparent behaviour controlled to some extent and intelligibility to appear from it. This requires a story, which is detailed here.

It will be important to note, though, that this project is more concerned with designing and showing interactivity through apparent behaviour than through an interactive narrative. Combining both would require additional resources isolating and measuring each’s level of closure and intelligibility in a meaningful way (As both [Aylett \(2000\)](#) and [Bruni and Baceviciute \(2013\)](#) warns). As a consequence, the story for the application has been kept, fairly strict and didascalic. The interactive in the work is kept at a minimum (as apparent in [4.2.1](#)).

I am not interested in providing a completely didascalic narrative to the application. The point of apparent behaviour is to allow the audience to perceive their own story. this is where the “interaction” lies. A success for this project will therefore be if the audience understands the theme of the narrative, and employ their own motivations on top of it.

In this chapter, both the story and how the application’s interaction was designed around it is detailed.

4.1 The original source

The intended narrative was selected for my fascination with the current political climate in the western world. The rapid rise of populism, seem similar to one of the oldest western works still in humanity’s possession today: Plato’s ‘Republic’. Plato was a

glaring aristocrat and had a both ideological and personal agenda towards democracy which he reportedly saw as both the tyranny of fools (With quotes such as *"He who would truly live ought to allow his desires to wax to the uttermost; but when they have grown to their greatest he should have courage and intelligence to minister them, and to satisfy all his longings... But the many cannot do this; and therefore they blame such persons, because they are ashamed of their own inability, which they desire to conceal; and hence they call intemperance base ... They enslave the nobler natures, and they praise justice only because they are cowards."* (Durant, 2005)) and responsible for the death of his mentor: Socrates (Durant, 2005).

Plato believed that a society undergoes 4 stages of degradation before finally arriving at the most perverse: a tyranny. Of these 4, a democracy is the stage just short of it (Russell, 2013).

Suffice it to say that at the point a society has made it to a democracy, it has lost all of its credibility in Plato's eyes — that being its Wisdom and Honour — and has been reduced to a mob-rule directed solely by the fleeting whims of the unwise. Around this time, a *demagogue*¹ would arise and through deceit and the fervent use of patos, take control of the hearts of the people. The people gives power to the demagogue who then, as promised, removes the current establishment only to instantiate himself as ruler. By the time the people realise they can no longer remove the demagogue from power, it will be too late and a tyranny is born.

It is this part of Plato's narrative I attempt to remediate.

4.2 Story Design

You are a person in a large group of people. These people walk around, occasionally bumping into each other. Each time they bump they get angrier until finally, a fight breaks out (True to Plato's own tendency to use the opinions of people as opinions of state, the people described here can also be seen as ideological or political issues tendencies which loose the patience with each other). I then introduce the state. Politicians with power sit above the struggling people. The people down below who notice the politicians, notice their power and starts rallying towards the politicians who try to pass attention away from themselves and as a result start fighting as well.

¹Perhaps best defined by Reinhard: *"He is a politician skilled in oratory, flattery and invective; evasive in discussing vital issues; promising everything to everybody; appealing to the passions rather than the reason of the public; and arousing racial, religious, and class prejudices; a man whose lust for power without recourse to principle leads him to seek to become a master of the masses."* Luthin (1954)

It is here the demagogue appears. As a man of the people, he shows from the crowd of the fighting middle-class and offers to beat the current system as the whole solution. For this he need power, however, which the people gives him. He breaks down the defences of the state and feeds the politicians to the people.

Having taken all power, the demagogue starts enforcing his own state. The people realise and tries to rebel, but is too late and is suppressed.

4.2.1 Interaction design

As debated, the narrative is kept linear. The experience is not long enough for the player to learn enough about their social role to act according to it in one try. This removes half the point of having a highly modular narrative [Aylett \(2000\)](#). As a results, the whole thing keeps highly non-ergodic [Ryan \(2001\)](#), and the lack of influence should provide mechanical closure while the static narrative should ensure closure on the narrative level [Bruni and Baceviciute \(2013\)](#).

What is more, the restricted impact on the story might help add an extra point to the application. Currently if one can only choose to have no power as a peon or little power and get overthrown as a politician, then it could give a sense of weight to the narrative — if not inevitability — since the player alone is unable to change the course of the state. While not part of Plato's original narrative, to my knowledge, it would still be a nice bonus to observe and heavily tint the narrative's *raison d'être* [Bruni and Baceviciute \(2013\)](#).

4.2.2 Narrative anchor

Given the highly abstract nature of apparent behaviour, I do not carry any hopes that the intricacies of the relations will be properly conveyed to even a small group of people, if they are not hinted. Remember from [Heider and Simmel \(1944\)](#) how not even the basic narrative was agreed upon between participants. In its pure form there is no symbolism to lean on, and Environmental Storytelling is in itself in such an early state of development that I cannot risk its instabilities or inefficiencies to muddy the purpose further.

Because of this, 'copy and narration' is used (see section [2.3](#)). The narrative anchors selected are fed into the application between each narrative event to give it context. While it stays in stark contrast to the highly abstract nature of my discourse to take such a rigid narrative telling device into play, it can perhaps also be seen as fitting, when

there is so little room for interpretation of the higher level goal: To convey a democracy through the eyes of Plato. Part III will evaluate how well this balance was struck.

This is not to say that the narrative has to be explicitly given to the audience. Text can be as vague as a quote from a slightly related topic, not even by the same author. The text between each narrative event, refer to different authors detailing the nature of democracy and the role of a demagogue has been placed so as to give the application meaning (for details, see section 5.2). It is then my hope that the audience brings the content of these quotes into their interpretation of the story.

Sum-up

In this chapter, the general story this project's application is designed around, is presented. Furthermore, the linear design of it, as well as its vagueness is detailed. The purpose of this all to allow apparent behaviour the focus so it can be more cleanly evaluated.

The next section will detail the design of the application based on this and the previous chapters' content.

Chapter 5

Application Design

Having found a story to mediate as well as a basic catalogue of functions with which to mediate it, this chapter is dedicated to the detailed design of the application from start to finish, and apparent behaviour's role in it.

5.1 Global Design

To fit the style of Heider and Simmel, only basic shapes are used as discourse, (figure [5.2](#), [5.8](#)). Circles were used here as research has suggested that these have the highest chance of being seen as causally linked [Beasley \(1968\)](#).

In order to use the inter-textual references proposed in [2.3](#), I separated the application into 4 separate parts. Each part can be viewed as a narrative event (henceforth a 'scene'), before which a small text is used to give context to it (figure [5.1](#)). This might seem guided, as the story should already be set at the start of the narrative, however, the demagogue will only be introduced later and providing a text which covers the material which the player needs to interpret the narrative would be lengthy and probably not well remembered when the end is reached. I therefore use this drip-feeding approach to space out the content, but also to allow more specific context in the texts. It is a hard balance to strike that the semantic of the text is not too guiding. Unfortunately, the resources allotted this project do not permit more than the problem's recognition. The texts were therefore selected by my general gut-feel after the parameters that they must not directly address the text, and follow the general light that Plato puts a democracy in.

The audience is thereby fed the underlying theme for the story through non-flexible sentences, and should tie these into their interpretation with the environment; The individualised perception of the shapes and their behaviour.

The four scenes shows: The radicalisation of the people, the appearance of the demagogue, the handing over of power to the demagogue and removal of the old system, and the tyranny, respectively.

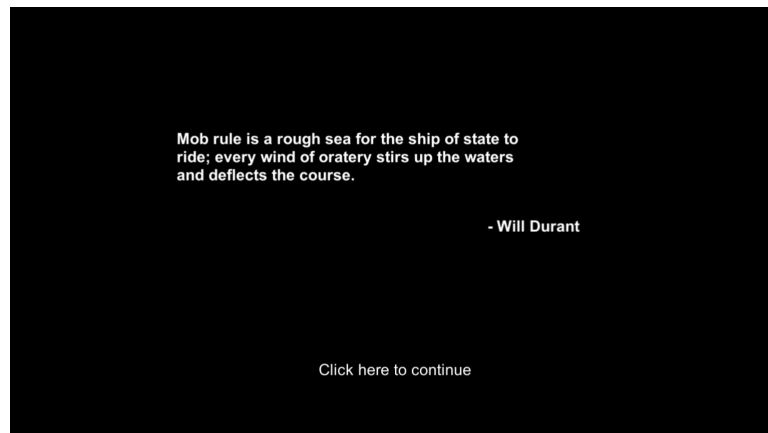


FIGURE 5.1: A small quote is shown before, after, and between each level.

5.1.1 Apparent Behaviour

Since apparent behaviour governs the character design as well as the environment's interactions I cover both here in detail.

5.1.1.1 Character Design

I have the following physical parameters to work with for the characters (figure 5.2):

Each character in is a circle with a dot inside it for an eye (So as to give the character a way to show attention¹).

Additionally, Heider & Simmel [Heider and Simmel \(1944\)](#) found that the size of an object helps determine how powerful it is. I therefore simulate a character's political influence and power through size.

At last, there should be a way to describe the character's current state of mind. Here I went to colour theory. A completely docile object is coloured white, while a very agitated object is completely red. The colour was chosen from the current western cultural

¹ Tracking the intentionality of an object requires the object to point towards the target as established by [Gao et al. \(2010\)](#)

perception that red represents anger and danger. [Stewart \(2017\)](#)

Only the demagogue and player are different : The player uses a cross instead of a dot as an eye to help the audience identify and keep track of it (figure 5.3). The Demagogue has a pointy end which it uses to break down barriers, and can grow much larger than anyone else; both of which, incidentally, also help identify it (and make it ‘different’ from the rest).

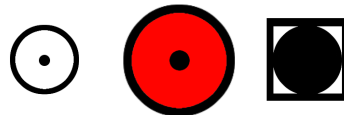


FIGURE 5.2: (From right to left) A normal impacting docile character, an impactful angry character, and an incapacitated character.

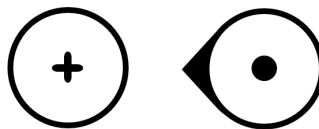


FIGURE 5.3: (From right to left) The player with its cross for an eye, and the demagogue with its ‘beak’. The demagogue can grow much larger than anyone else, but starts the same size.

5.1.1.2 Action Design

Besides basic navigation, 3 basic actions were implemented which certain characters can perform in specific scenes:

The ‘hit’ action (figure 5.4a) allows a character, after moving up to a target, to move into the target and back, while torpedoing the target character away from the hitter. This action uses the launching effect dating back to Michotte’s founding paper [Michotte \(1963\)](#).

In the second — ‘prison’ — action (figure 5.4b), a hit animation is carried out like before, but instead of being launched back, four ‘walls’ appear tightly around the target character and its colour is faded to black, leaving a static box (figure 5.2). The drastic change in the character, among which the eye disappears, followed by its complete lack of movement should give the message that character 1 incapacitated character 2.

The ‘steal’ action (figure 5.4c) concerns the handing over of power from one character to the other. Remember that size is used to simulate a character’s influence. Each

character involved shakes once in the same pattern. This should make these characters seem as if making a group effort, linking any action which is performed at the same time to the group as a whole. The shake follows strict spatio-temporal synchronicity, during which one or more of those characters shrink at the same time another grows proportionally. This should convey that one gave power while another received. Unfortunately, perception of causality research does not help much here, however, the action was designed with the field's tendency to prefer strict spatio-temporal relations in mind.

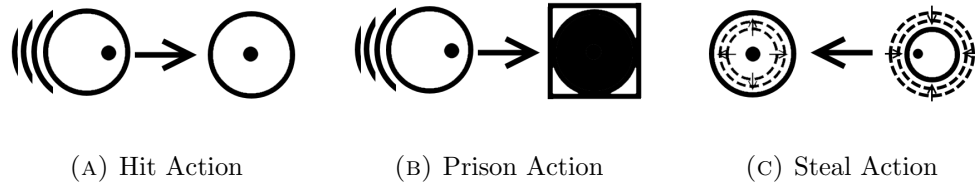


FIGURE 5.4: Symbolic representations of each of the 3 possible actions, as they also appear in the action-selection wheel for the player.

5.1.1.3 Character Behaviour

Each character takes care of its own behaviour in accordance to its role. A centralised system ensures that all characters always perform appropriate behaviour according to the current scene.

The path-finding has intentionally been left to not consider moving characters, characters therefore often bump into each other.

When a character bumps into another for any reason, their anger is raised, and they stop for a moment so as to compose themselves. They will also look at the other character, until normal behaviour takes control again. This should help the audience identify the characters involved with the action, and make them aware that the characters noticed the transgression and was angered by it. This plays a vital role in the first scene.

Every action a character performs, including moving around, has a target reference or position. The character always looks at this target. This helps direct the intention towards that target, and has been shown in etc. the Wolfpack- and Chasing Effect to greatly increase the audience's correct interpretation of intentional movement. Even if the character has to make a detour to get there.

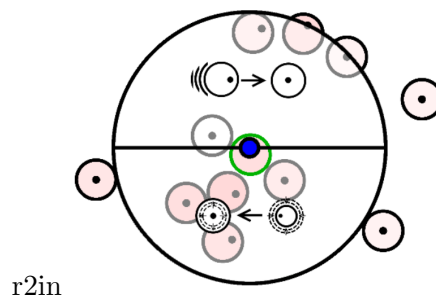


FIGURE 5.5: The selection wheel, added upon clicking the right mouse button on top of a character, which is then selected. The ‘Hit’ and ‘Steal Influence’ commands are available.

5.1.2 System Interaction

A player can move their character around the screen by clicking somewhere with the left mouse button. They can also left-click other characters to follow them around (as noted in 5.3, only PC and mac is supported).

Upon right-clicking on another character, a selection-wheel appears (figure 5.5) from which the player can choose which action to perform towards the designated character. The action signs in the selection wheel are iconic and mimetic so as to not force my interpretation onto any of them. It fits well with the player operating an uncontrollable political landscape that they first need to learn what consequences your actions have. Which actions are available to the player is decided at the start of each scene.

The currently chosen character (both left- and right-click) blinks green in any otherwise black section. An imprisoned character can not be selected. Neither can static objects such as boxes.

In order for the character to never miss an important action in the environment, the whole scene is always seen, and the player will therefore be able to see all interesting events at all times².

²In accordance to the advice of Aylett (2000), who states that an audience looking away from an interesting event is destructive to their understanding of the environment.

5.2 Individual levels

In the following, each individual scene is described in an orderly manner. The setup and possibilities are likewise detailed.

5.2.1 Scene 1 : Radicalisation

In the first scene (figure 5.6) a democracy is first established, and a bunch of characters are seen walking around. These both works as conscious agents and as metaphors for ideologies coexisting within the narrative. As the ideologies keep rubbing each other, they become agitated and start fighting among themselves, though. They also loose the attention of their current fight, if any fight beside them bumps into them. This works as a metaphor for the lack of attention and stability with which Plato saw ‘the mob’.

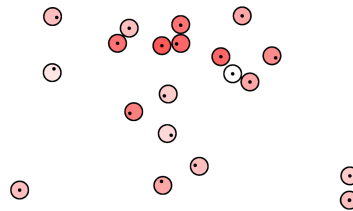


FIGURE 5.6: The first level, in which there is no geometry except characters.

The quote : before this scene states: “Mob rule [Democracy] is a rough sea for the ship of state to ride; every wind of oratory stirs up the waters and deflects the course.” from ‘The Story of Philosophy’ by [Durant \(2005\)](#)

I here hint towards the characters being part of a democracy (which was added to make it more obvious. Is is safe to say that few people consider democracy ‘mob rule’ these days) and that this system is highly unstable, as is evident by the system’s rapid descension into violence. The story starts with this one sentence and scene.

Look and Behaviour : There is no geometry in the scene except for a number of characters. 19 non-player characters (henceforth NPC) and a player is added upon start. They are all of equal (moderate) size and white (completely docile). The NPCs have 2 possibilities here: Walk around or hit other characters. The characters do not take the other moving characters’ paths into consideration when walking around, and therefore often bump into each other. This will anger them and tint them red. The more angered the character, the higher the chance of hitting the aggressor which it last collided with, after a short delay, before resuming the walk. This positive feedback loop will rapidly

result in a “bar-fight” as the aggression escalates and characters start hitting back on the hit they received for hitting.

The player : is able to walk around, hit a character or steal influence from it, at any point during this scene. They will be interrupted if bumped into, but will not automatically hit back. They are tinted red like the rest, and therefore count towards the end state.

The scene ends : when 6 characters have reached a certain threshold of agitation (currently 0.7 out of a maximum of 1. Each hit increases agitation by 0.05 from 0).

5.2.2 Scene 2 : Demagogue entry

In the second scene (figure 5.7) the democracy is fighting itself: At the same time there is a difference between the characters. The politicians are introduced and stand in contrast to the common rabble by their size and their isolation from the hoi-polloi. The mob is still fighting among itself, but also beating on the politicians who they believe to be the source of all the problems. Enter the demagogue.

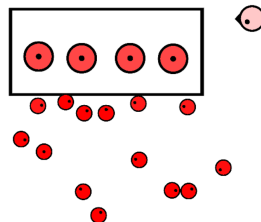


FIGURE 5.7: The peons fighting themselves and beating on the wall which the politicians are hiding behind. The demagogue approaches from the top right.

The quote : before this scene states: “You [demagogues] are like the fishers for eels; in still waters they catch nothing, but if they thoroughly stir up the slime, their fishing is good; in the same way it’s only in troublous times that you line your pockets.” in ‘The knights’ by [Aristophanes \(424BC\)](#)

Aristophanes old attack on Cleon seemed appropriate here, as it only hints to what the demagogue who enters here is actually doing. The uninitiated still don’t know what a demagogue is, and there is therefore a sense of mystery and lack of intention surrounding it. It is also a sentence which removes attention from the politicians who the mob is beating upon, drawing attention to the fact that they are in fact not really important as anything else than a tool (as the symptom of ‘troublous times’).

Look and Behaviour : The second screen shows 4 bigger characters in a black box which symbolises their distance from the common rabble).

A group of characters are hitting the box repeatedly so as to try and break it, and another group is still fighting itself.

The behaviour of the characters do not change much before the end. They just keep hitting. All are already highly agitated on start.

The demagogue starts the scene small er than the rest of the characters. It is also easily recognised by the 'beak' protruding from it. The demagogue starts in the top-right corner and slowly moves toward the right side of the box. When it arrives the demagogue hits the box several times, during which every other character will immediately stop everything they are doing and look towards the demagogue. Remembering the wolf-pack effect, this should move the player's attention towards the demagogue, and highlight its 'hitting the box'.

The player : can have one of 2 roles here: if they stole influence from other characters in the first scene they will have grown to become a politician, and sit within the box with the others. Otherwise, they start as one of the fighting group. The player can move around or hit other characters in this scene. When the demagogue hits the box the player is also the only character not to freeze. They can hit the other characters if they want, but to little effect.

The scene ends : when the demagogue has hit the box 3 times.

5.2.3 Scene 3: Demagogue rise

In the third scene (figure 5.8) the demagogue is now in focus. The hitting on the box in the previous scene has shown that it is willing to break the box and allow entrance to the politicians, but it needs the strength of the people to help it. The people therefore gives if the power it needs and the politicians are drowned in the flow of the mob when the walls break. The people have now unwittingly given the demagogue the power to rule.

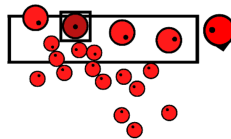


FIGURE 5.8: The politicians being overrun by peasants after the demagogue has broken the walls

The quote : before this scene states: “What is a demagogue? He is a politician skilled in oratory, flattery and invective; evasive in discussing vital issues; promising everything to everybody; appealing to the passions rather than the reason of the public; and arousing racial, religious, and class prejudices; a man whose lust for power without recourse to principle leads him to seek to become a master of the masses. He has for centuries practised his profession of ‘man of the people’. He is a product of a political tradition nearly as old as western civilisation itself.” by [Luthin \(1954\)](#)

Having only vaguely hinted as to the nature of the demagogue in the earlier scene, this time its nature is described in detail. If the player has not yet realised that something is wrong, they should do it here, where they are being told that demagogues are bad and vain. For those who do understand this from the start of the scene, they can do nothing but watch as the demagogue destroys the old system and takes over.

Look and behaviour : The third scene is heavily scripted due to both the player’s lack of influence, and the complexity of the thing in general.

The politicians-in-a-box are still there, the peasants outside are there, the player has the role from the last scene, and everyone looks at the demagogue. There is a dramatic pause, the demagogue beats the wall a couple of times, waits, and then starts attacking the box. Every character outside the box (except the player) will then start shaking to the same pattern as the demagogue, which will grow bigger without the others growing

smaller. The politicians will start shaking the same pattern as everyone else and shrink (also if player).

At last, the box breaks and the peons attack the politicians relentlessly. The politicians are imprisoned.

The player : has little influence in this scene. If they are a politician they can only walk around inside the box, and if they are part of the mob they can walk and hit but nothing they can do will be paid much mind to by the others.

The scene ends : when the last politician is imprisoned, and the demagogue bigger than everyone else.

5.2.4 Scene 4: Tyranny

In the fourth and final scene, a tyranny has been established (figure 5.9).

The demagogue now has all power and is suppressing the other characters. They might try to rebel but can do nothing. In the end, there is little left that has any significance except the demagogue which now rules.

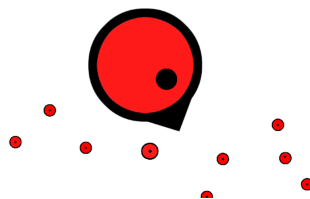


FIGURE 5.9: The demagogue has won all power and is constantly shaking the peons. Those trying to attack are imprisoned.

The quote : before this scene states: “Democracy has never been and never can be so durable as aristocracy or monarchy; but while it lasts, it is more bloody than either. ... Remember, democracy never lasts long. It soon wastes, exhausts, and murders itself. There never was a democracy yet that did not commit suicide. It is in vain to say that democracy is less vain, less proud, less selfish, less ambitious, or less avaricious than aristocracy or monarchy ... Individuals have conquered themselves. Nations and large bodies of men, never.” in a letter from John Adams to John Taylor ([Adams, 1814](#))

This statement follows well, I think, the mind of Plato’s work, where the democracy is seen as inevitably doomed. Remember, ignorance has no defence against itself.

Look and behaviour : The demagogue is gigantic in this scene, and only small characters exist otherwise. They are placed below the demagogue. The demagogue constantly steals influence from the other characters which shrink to their minimum size. Even then they are still shaken about by the colossus. The other characters want to rebel, and do occasionally try hitting the demagogue, which will attack them back and imprison them. By that logic the characters can hit the demagogue or idle. The demagogue either steals influence or imprisons attackers.

The player : is not necessarily part of this scene. Only if they stayed part of the mob do they have an avatar here. Which is treated the same way as every other non-demagogue. If they became a politician, they would have been imprisoned in the last scene, and not be represented here.

The scene ends : After 30 seconds, or after the demagogue has imprisoned 3 characters.

5.2.5 Final note

The sharp reader might have noticed how the politicians were only introduced later, after the characters had already begun fighting. This is also entirely intentional from a narrative perspective. The politicians are never the cause of the fight. They are merely the embodiment of it, and, ultimately the scapegoats. If a politician is an extension of its voter-base then their conflict can never be about the men-up-high; only a proxy-war between the people.

5.3 Implementation

For the reader who might want to replicate this test and draw inspiration from its design, this section is dedicated to the specifics around the implementation of the application.

5.3.1 Compiler

Since the test was created online (as will be detailed in [6.3](#)) had to be usable on-line. For this, Web-GL seemed a fine choice, as I would therefore not be bound by having to create separate binaries for different systems. Everything would happen in the browser together with the questionnaire (see section [6.3](#) for more info on the test environment and design).

The Unity engine provides an integrated compiler for building its projects in Web-GL, for easy insertion into a web page. Combined with Unity's more than adequate 2D game development environment, it became my engine of choice. All code was written in C#.

5.3.2 Application Flow

The scene manager existed as a simple singleton, which lay on an object which existed in all scenes. It did not persist between scenes. All behaviour scripts needed for the specific scene was then inserted manually on this object in each scene, so there was no need to go and find it. Data which needed to persist was stored as static data (which persists between objects and scenes).

In the following, the application's flow is described step-by-step from start to finish. This flow is maintained by the scene manager.

1. The Game starts.
2. The player presses continue on the welcome screen.
3. The tutorial appears.
4. The player goes through tutorial point 1-3 and presses continue when done.
5. The Screen fades to black
6. The New level's quote fades in
7. The player presses continue when ready.

8. The quote fades out while the level fades in.
9. All behaviour starts. The game waits for end signal.
10. End-signal is given. The things which needs to be saved to load the next level is saved and added to the list of saved states.
11. If last level, show end message, else continue.
12. The next level's quote is faded in.
13. The game waits for x seconds.
14. The next level is loaded.
15. Go back to point 7.

5.3.3 Character Behaviour

Each character consisted of a simple core, which stored the currently working action as well as all reference animation scripts (movement AI, body shaking script, colour changer, etc.)

It is also this core that decides when a new action is to be made, by calling that level's Action Selector.

The Action Selector is a state machine which decides when a certain character can do what. It takes in the type of character, and decides which actions are possible based on the state of the scene, what triggered the new action selection and what the state of the character is.

If, for example a character in scene 1 has been pushed, the action selector could decide that it is agitated enough to push back. It will then instantiate the necessary action as an object, which then manipulates the character until it is finished and destroys itself.

There exists an Action Selector for each Scene, which allows for the highly scripted environment which I employ.

For any special cases, such as waiting on specific actions, event systems can generally be recommended. A couple of these were employed for e.g. bumping recognition.

Sum-up

In this chapter, the design and implementation of this project's application was presented. Based on Plato's republic described in the previous chapter, it involves a 2D environment built on 4 scenes, each separated by a quote from some famous philosopher, who does not directly refer to the events in each scene. The application start in a small democracy and ends in a tyranny.

The specific design-choices for the character's visual and behavioural design is described, as well as the detailed flow of the application. At last, a more technical documentation is given in which the compiler choice and general programmatic structure is reviewed.

The second part of this thesis has been concluded. Part III will concern the test which was employed to test how well the here described application answered this project's problem statement.

Part III

Testing

Intro

Having introduced the problem proper in Part I and described an application to solve it in Part II, this part details the test which was performed to test the application's success at reproducing an adequate level of closure and intelligibility.

The structure keeps rather conventional: The methodology with which I test the application is first described in detail. If one looks to reproduce my test, they should find a complete guide here. Second, the results from the executed test are presented, followed up by a general discussion during which I draw conclusions about the sufficiency of the application with regards to my problem statement: *“How can Apparent Behaviour be used in an Interactive Narrative context, where a story is interpreted with a general level of thematic control from the author?”*.

Chapter 6

Methodology

This chapter describes the method by which the application is tested for closure and intelligibility. First by detailing the parameters, how data was collected, and at last the procedure.

What appeared from this test is described in the next chapter.

6.1 Purpose

As discussed in [2.3](#), it is imperative that the intended subject matter is understood at a rough level for the audience to start interpreting what they see in the —to the author— wanted context.

With the previously defined problem statement: *“How can Apparent Behaviour be used in an interactive narrative context, where a story is interpreted with a general level of intelligibility towards the author’s intention?”*, this method aims to test the success at forcing a broadly-stroked narrative within an apparent behaviour setting, where the author has some form of control over the theme.

This is achieved through a mix of quantitative and qualitative self-report measures, in a confirmatory study in which the level of comprehended narrative is measured quantitatively, while the specific narrative is found qualitatively.

The null-hypotheses therefore becomes *“No story is found”*, and, if that is rejected, *“There is no consistency between which narrative the audience perceives”*.

6.2 Parameters

When testing for intelligibility there are 3 things I think of importance to the results:

1. What level of intelligibility does the participant perceive,
2. When is it perceived, and
3. What is perceived.

A method has already been established for measuring the level of narrative using Ryan's 8 narrative requirements [Ryan \(2006\)](#) (see section 2.3).

To measure this level of intelligibility in a quantitative way, a composite scale was created. Each level of intelligibility is measured with a 5-point likert scale (balanced, disagree to its existence, agree too its existence). After the test, each question is evaluated and we count from the bottom-up how many levels received a 3 or higher score. Counting is stopped at the first level below. The scale will only use 6 of the proposed 8 levels. Level 1 and level 7 have been disregarded, as I find the first level to be obvious unless the participants be blind, and the 7'th to not be a valid requirement for a story in this context¹. This way, a likert scale 1-7 (with the selected levels) from no intelligibility at all, to the full comprehension of a story is made.

It would be useful to know how visible each level was as well. Both for experimental analysis and for better understanding how obvious Apparent Behaviour makes each level. Each level is therefore also equipped with a 5-point likert scale "I never noticed" - "It was obvious all the time", onto which the same composite scale is imposed.

For the second parameter, categorical data for each narrative level is gathered through the question: "when did you first perceive it?". It is also for this purpose that the application is divided into scenes of single narrative events² (see section 5.1). Here, the options were separated into the scenes 1-4, 'tutorial' or 'never'.

The third measure, this project has no way to measure quantitatively. The closest 2.3.2.1 comes to finding a measurable score-system is the RTT(-retelling) system from sociolinguistics, however, this measure requires great professionalism from the interpreters.

¹I do not care if e.g. the participants believed that everything was made up inside the mind of an ant

²A trick which [Heider and Simmel \(1944\)](#) also used.

What more, the RTT measure has been designed for texts in which a direct sentence-to-sentence comparison can be made, this project's highly abstract perception-focused system does not register within that category. The measurement of this parameter is therefore going to be fully qualitative, and therefore less scientifically confident. An open-ended question "what happened in the game" has been added to the start of the evaluation³, as well as several open-ended questions which asks further to the specific levels of the narrative. I gather what can be said from these.

6.2.1 Additional

There is only one mechanism for adding control to the perceived narrative, how this measure was perceived as well as how relevant it seemed and when.

First, the specific meaning of each quote was found through an open-ended question "what did each quote mean to you?". This is used to later hypothesise the reasons for why/why not the third measure (mentioned above) turned out as it did.

Participants were also asked how relevant each quote was to the application, as well as when they realised. This should help measure whether participants correctly tied the meaning of the quotes to the narrative in the application, and by extension, if these quotes helped the narrative.

At last, it would be useful to note if people's preference towards the application could have an influence on the results. Maybe people spend less effort interpreting the application if they find it lacking? For this purpose a likert scale is included both for general preference and participants' experience with the controls.

The complete questionnaire can be found in [Appendix A](#).

6.3 Data Collection and Recruitment

The test in its entirety consisted only of a questionnaire and the application. The questionnaire was employed upon the completion of the game, which was easily controlled. Combined with the schedule for this project, as well as the focus on self-report measures, meant that there was little need for the researcher to be present and the entire test was therefore moved online.

³Also borrowed from [Heider and Simmel \(1944\)](#)

Participants were found through the crowd-sourcing platform 'Prolific'⁴, which allows researchers to upload a link to an online test, and hire a number of registered participants to run through it for a set pay.

The questionnaire was deployed in Google Forms⁵, and placed as a separate page above the game-screen (figure 6.1). After having collected the necessary preliminary information⁶, they were to scroll down to play the game, and up again to complete the questionnaire, submit it, and return to prolific for their pay.

6.3.1 Target-group

Since storytelling is a practice as universal as speech, the comprehension of storytelling and visual pictures should therefore be somewhat comprehensive for every human owning these two faculties (That is, most people).

Looking at availability and recruitment, as well as the type of test-application, however, a few restrictions can be made: First, I sample with some form of convenience, as I restrict recruitment to the prolific-website.

6.3.1.1 Screening

Prolific comes with an overwhelming amount of pre-screening variables with which one can fit almost any target-group. The screen variables we used were rather simple, and primarily concerned making sure that people were equipped mentally to comprehend the application's quotes and subject material. Three limits were therefore made:

- *The approval rate on previous studies should be at least 90%:* Prolific comes with an in-built approval system where researchers can report and return respondent

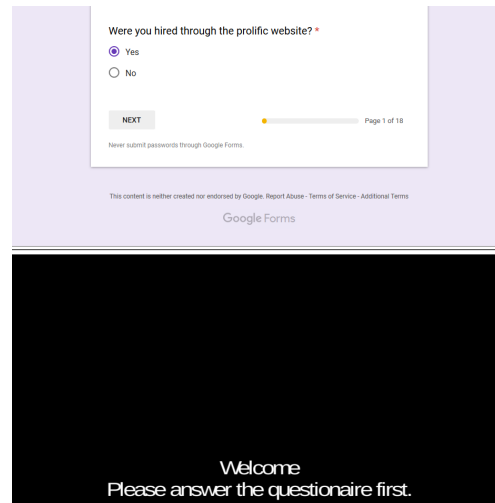


FIGURE 6.1: Screenshot of the website on which a participant takes the test. The questionnaire is presented at the top while the game can be played at the bottom.

⁴<https://www.prolific.ac>

⁵<https://forms.google.com/>

⁶Which was exclusively confirmation that participants came from prolific, as well as their id for cross-reference of the demographic data contained on prolific

who propose unreasonable answers, or cheat. I did not use this system to report any participants myself.

- *The allowed age range was between 18 and 100*: Given the fact that some of the application's text was written a couple centuries ago, only applicants of at least legal age were allowed, at which point I expect them to be able to decipher such texts. This leads to the last parameter.
- *The Native language must be English*: I do not blindly trust anyone who is not a native in English to properly understand anything written by Aristophanes or John Adams.

6.4 Procedure

The procedure for each participant went as follows:

(All questions are reported in Appendix A. Q<Some number> indicates the question in this appendix.)

1. Participant was hired through Prolific.
2. Participant was given an ID on the prolific website, and then redirected to the web page hosting the test.
3. The questionnaire asks if they came from the prolific website.
4. Asks to scroll to the bottom of the website and play the game.
5. Participant plays the game in full.
6. Asks in the game to scroll up and finished the questionnaire.
7. A question asks if the game has been completed. Keeps looping if no is answered. { This was done to prevent the trigger happy participant from accidentally skipping the game. }
8. Asks what happened in the game. Open-ended, participant can write as much as they want (Q7).
9. Asks for preferences. Participant was asked if they liked the game, and how they found the controls through likert scales. They are then asked to specify through text (Q8-11).

10. The level of intelligibility is then measured. Participant has to indicate how they agree to a statement for each level of intelligibility through likert scales. After each likert, they are asked to specify. Each level is separated by a page (Q12-23).
11. Asks to indicate for each level of intelligibility, how visible it was during the play through (Q24-29).
12. Asks, or each level of intelligibility, when participant first noticed it. 'Never', 'Tutorial' or the scenes 1-4 (Q30-35).
13. Asks what each quote means to the participant (Q36-39).
14. Asks how relevant each quote was to the game on a likert scale, and for each quote, when the participant first noticed. 'Was not relevant', 'When it appeared', 'Later in the game', 'After the game' (Q40-47).
15. Closing questions for how participant would play a second time, and if they have any closing comments (Q48,49).
16. Is thanked for participating and asked to return to prolific through a specific link.
17. Participant return to prolific and is paid.

Sum-up

In this chapter the methodology for this project's test of closure and intelligibility in the IN-application has been detailed in full.

The next section describes the data which was collected through an implementation of this test to prepare the reader for the evaluation.

Chapter 7

Findings

There were a total of 30 responses to the test. This chapter shows a summation of the results gathered from the test (the raw data can be found in [Appendix B](#)).

7.1 Demographics

All demographic data was gathered from Prolific.ac, which provides a wide range of data for this purpose. As seen in [table 7.1](#), the gender split is very equal with a 16-14 split, and participants' age range around 20 - 47.

This is, an acceptably wide audience for this type of experience.

The time averaged around 18 minutes. The fastest participants also showed little understanding of the narrative and the project, and therefore had less to write.

Demographics	Male	Female	Age (M)	Age (SD)	Time(Min)	Time(Avg)	Time(Max)
	16	14	34.7	13.8	7:18m	18m	38:22m

FIGURE 7.1: Table showing participant demographics.

7.2 Results

The data was imported and processed in Matlab.

The following scaled were fitted: *controlability*, *preference*, composite scale *closure level*, composite scale *visibility*, and *general relevance*.

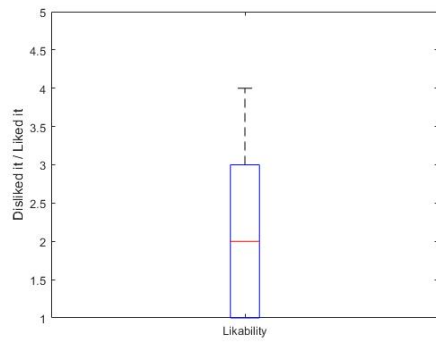
The figure 7.2a shows the general preference towards the game as reported by participants. It shows that people in general did not like the application.

Figure 7.2b shows how many problems people has with controlling the application. Scoring low meant that many problems were present. Again the general score was low, however, the qualitative results suggest that this might have been caused by people's frustration with being dis-empowered in some cases.

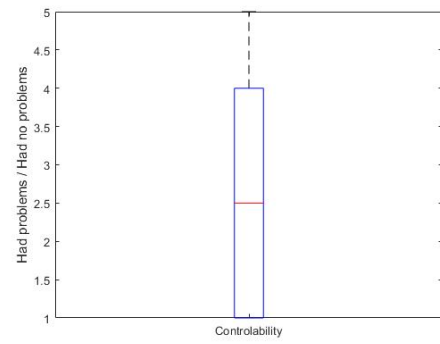
Figure 7.2c, show the two composite scales for the level of closure and the level of visibility perceived. The low mean for both of them shows that many people did not perceive any visible closure above the temporal level.

At last, figure 7.2d shows the general averaged relevance people attributed to the quotes. It shows that while most people attributed some relevance between them, many did not. A closer look at the specific data also shows that in many cases the high scores were caused by a high score in single quotes, which is why the median plot shows a more 'bottom-heavy' distribution.

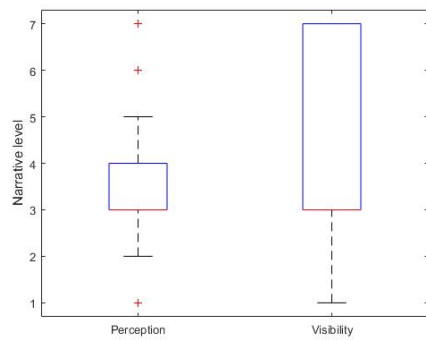
7.3a, and 7.3b show spreads for the categorical data recorded. The categorical data depicts the spread of when people realised when each quote was relevant to the application. They also depict when participants realised that each level of closure was present.



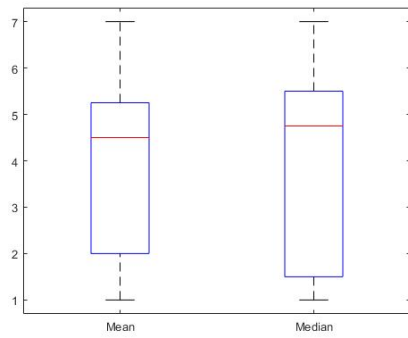
(A) Box-plot depicting how well people liked the application, from (1)'Disliked it' to 'Liked it'(5).



(B) Box-plot showing how many problems participants had with the controls. (1)Un-controllable - (5)No problems

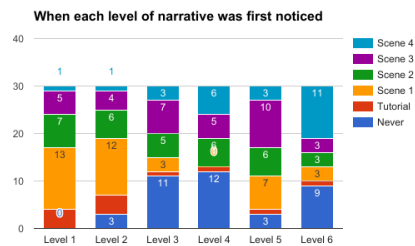


(C) Boxplots depicting the composite scales for both the perceived level of closure and each's visibility.

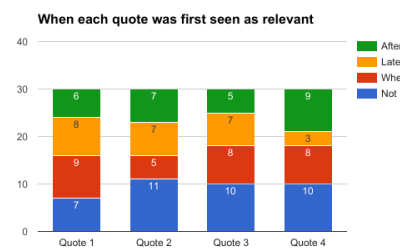


(D) Box-plots depicting the averaged relevance both as mean and as median. Note that these were 7-point scales. (1)'Very irrelevant' - 'Very Relevant'

FIGURE 7.2: Score data



(A) Plotting of the categorical data concerning when each level of closure was first perceived.



(B) Plotting of when each participant first perceived each quote as being relevant.

FIGURE 7.3: Categorical data

Reliability

During the perception of the methodology, there has not been put much attention towards reliability and validity. While I believe the closure scale to be sound, there is still much one can do to improve upon the measure, especially from intelligibility (see section 8.3).

For now, however, measuring Cronbach's Alpha will have to suffice as a reliability measure.

When comparing the 3 scales closure, visibility, and relevance, things are not all that hopeful. $A = 0.6523$. When, however, relevance is removed, closure and visibility gives $A = 0.8360$.

Parametric

For each scale, a One-sample Kolmogorov-Smirnov test was made to find if any of the scales were parametric. It was not necessary to measure the variance for any of the scales afterwards.

Scale	p
Preference	5.6e-20
Control	7.3e-20
Closure	7.3e-20
Visibility	6.9e-25
RelevanceMean	7.3e-20

FIGURE 7.4: One-sample Kolmogorov-Smirnov test results for each of the 5 scales. Every test managed to disprove the null-hypothesis that the data was normally distributed, and so no parametric correlations can be made.

Correlation Coefficients

Given the non-parametric nature of all the data, a Spearman's rank correlation (henceforth Spearman's Rho) was made on the scales to find if any correlations existed between the scales (figure 7.5).

Narrative Level vs Visibility As a stability measure, the correlation between the level of closure and the visibility was correlated. The results showed high confidence ($p=.000002$) with a coefficient of .75, so a positive correlation. A later polynomial fit also revealed a positive correlation, which confirms the data (figure 7.6a).

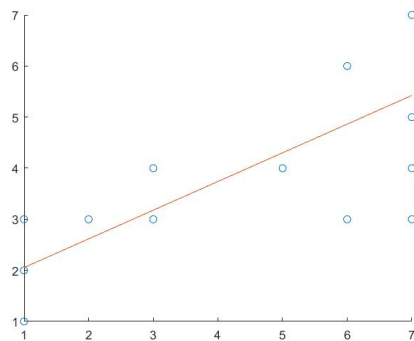
Preference The preference and controlability measures were made to test the influence the general perception of the game has had on the perceived level of narrative. The correlation results show no confidence that this should be the case ($p = .4$).

Likewise, I measured if there was a correlation between

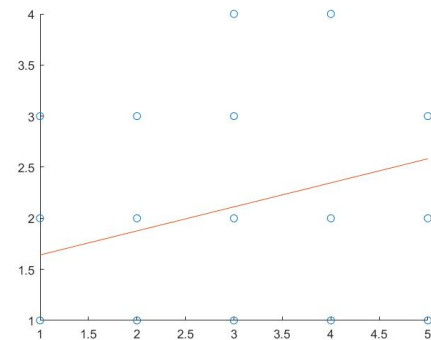
The preference towards the game, and the amount of frustration participants had with the controls. There was a weak positive correlation ($p = .097$, $r = .31$). Another polynomial fit confirmed this (figure 7.6b).

	p	Rho
AgreeVis	2e-06	0.75
LikeAgree	0.4	0.16
LikeCont	0.097	0.31
RelGenMeanAgree	0.38	0.17
RelGenMeanVis	0.18	0.25
Rel1Agree	0.78	0.05
Rel2Agree	0.83	0.04
Rel3Agree	0.29	0.199
Rel4Agree	0.14	0.27
Rel1Vis	0.599	0.099
Rel2Vis	0.36	0.17
Rel3Vis	0.15	0.27
Rel4Vis	0.084	0.32

FIGURE 7.5: Spearman's Rho coefficients and confidences performed on most variable combinations.



(A) Polynomial fit depicting the positive correlation between Closure and Visibility.



(B) Polynomial fit depicting the positive correlation between Preference and Controlability.

FIGURE 7.6

General Relevance No correlations were found when the general relevance (mean) of each quote was compared to the perceived level of closure or the visibility.

Specific relevance The perceived relevance of each of the quotes were likewise compared to the perceived level of closure and visibility in turn. Of these results, only the last quote showed a weak confidence towards visibility ($p = .084$).

This correlation was positive ($r = .32$) like all the others.

Sum-up

In this chapter, the results from a test, following the procedure from the last chapter on 30 participants, were presented. The test showed a fair gender-split, and good to dubious reliability according to Cronbach's Alpha.

All correlations performed showed a positive coefficient, however, only few of them showed any correlation.

In short, the lack of correlation between the quotes' relevance and the perceived level of closure indicates that the quotes had little relevance on the narrative, which does not bode well for the final problem statement.

In the next chapter this issue, and why the conclusion is not as clear as a 'it failed' is properly detailed.

Chapter 8

Discussion

To properly understand the success of this project's test there are several things which needs to be considered.

First, the success of the application is assessed. From there, the specifics are debated: The preference evaluation, conclusion on relevance, as well as the performance of the composite scales is evaluated. To this, both the categorical data related to when, as well as the qualitative data related to why and what (the latter can be found as a transcript in Appendix B) are included.

Each of these topics are debated in turn, and conclusions on the general success at denouncing the null-hypotheses are made: *“No story is found”* and *“There is no consistency between which narrative the audience perceives”*. At last the problem statement is debated: *“How can Apparent Behaviour be used in an interactive narrative context, where a story is interpreted with a general level of intelligibility towards the author's intention?”*

8.1 Preference

There was a concern in 6 with regards to players influencing performance. It is currently unknown if apparent behaviour is as irresistible as perception of causality, and the fear is that if they do not care for the application, then they do not perceive a story. Looking at the lack of correlation between relevance and closure, this does not seem to be the case. The correlation between the game preference and the level of closure showed no confidence. It fits well with the theory that apparent behaviour and the perception of causality is an irresistible phenomenon.

The general preference was low, though. The mean lies at 2, which is on the 'dislike' side, and the preference only approach indifference (figure 7.2a).

The controlability seem more promising, albeit not stellar. With a mean of 2.5, the results seem stretched to also include scores above 3.

The performance of the controlability do seem able to predict the performance of player preference to some extent (albeit a weak link of 91% accuracy), This shows importance of controlability to the preference of the game. It is clear that the application presented is not for everyone. First, by taking control away in the later scenes (see chapter 5), it does not follow conventional game-design-rules (not that there are any rules to begin with). Second the theme and point of story seemed to not fit well with some participants¹.

While the dissatisfaction with the narrative content was indeed observed, the control issues, unfortunately seemed to have more to do with a sub-par control-scheme and reaction, than it did outrage that control was taken away².

It is clear that the general success of the application needs to be seen in this light. That such a core part of the interaction-design was not correctly perceived proves room for improvement on the application's design. This issue cannot be proven to have had an impact on the perception of closure, though, and will therefore be ignored as potential unsystematic bias.

8.2 Narrative Perception

Looking at the composite scales for both closure and visibility, it seems clear that the problems Heider and Simmel (1944) experienced when participants did not perceive a narrative have not been solved. Ideally, closure's mean should lie around the top of the scale for a narrative to have been properly perceived. This, as seen in figure 7.2c is clearly not the case. The mean lies on 3, in the spatial dimension which confirms that our Perception of Causality constructs worked flawlessly, but failed to consistently even produce animacy.

The intelligibility of each level also seem to be supported by the visibility, as can be seen by the correlation coefficient.

¹e.g. p13 Q39 *"I didn't agree with this as i just believe democracy always lives on in a different form"*

²e.g. p8 Q11 *"I kept clicking but they weren't doing anything. Occasionally let me select an option."*

8.2.1 Relevance

Having concluded that no confidence was reported in the perception of narrative I look to the relevance statistics of the quotes. The quotes were, after all supposed to bind a narrative to the application. It is clear from the correlation statistics that there was no correlation between most of the quotes' relevance and the level of perception or visibility reported, despite most participants reporting that the quotes were relevant to the story. Only the last quote seemed to show a weak correlation to the level of visibility, this might show the last quote's ability to make the audience realise what the whole thing was about, however, when no narrative was perceived, this hardly matters. Also when comparing the general relevance to each composite scale, no correlation was found.

With this, it can be confidently said that I did not manage to reject the null hypothesis *"No story is found"*. And the text did not seem to affect the level of perceived narrative.

8.2.2 On the Qualitative Data

For the second null hypothesis: *"There is no consistency between which narrative the audience perceives"* however, it is necessary to look at the qualitative data for those participants who did perceive something. When comparing every narrative and loaded word as well as every note on how the quotes were relevant, responses seem oddly consistent compared to [Heider and Simmel \(1944\)](#)'s results. Every participant who wrote about anything more intentional than "the balls bounced off of each other" wrote about governments³, or democracies⁴, or demagogues⁵, or tyrannies⁶. This is consistent with — if one looks at the raw data — participants who reported low scores of relevance, also reported a lack of understanding qualitatively. This lack of understanding was, however also a trend for the higher scores, and could be why no correlation is seen.

In conclusion the quotes thereby seem to be binding the narrative to the story correctly, only, they don't enhance the perception.

With that it can be concluded that while text failed to influence the level of perceived narrative, it does seem to stabilise the theme when participants do perceive something above the temporal level.

³e.g. p13 Q7 *"There was lots of little demagogues that i think represented people and different types of rule over the years. They all seems to get lured to a leader of some type"*

⁴e.g. p22 Q7 *"t didn't make any sense to me. Sonething to do with democracy and the monarchy. Democracy is a troubled state."*

⁵e.g. p16 Q7 *"You followed fellow balls around while quotes appeared describing demagogues and democracies. The game seemed to parallel the quotes to a degree."*

⁶e.g. p29 Q7 *"You play as a ball who is a nobody while the story describes a demagogue. The ball grew until it eventually 'died' (became black). Then a larger red ball crushes all the remaining other balls, much like a tyrant."*

8.3 Future Work

As has been stated on several occasions, there have been several areas in which this project has had to cut short because of resources demands. Additionally, there are several areas which might prove interesting to the problem. All of this is compiled and presented in this section.

8.3.1 Method

Besides the obvious lack of focus on validity, the closure and visibility scale seem to function to a satisfactory degree. What would be next is to find a measure for determining the closeness perception to the intended intelligibility. One can draw inspiration from the RTT-retelling scale, but ultimately not use it, because of the more abstract, and inherently interactive nature of the medium.

8.3.2 Reinforcement

Since I could, ultimately not disprove the null-hypothesis that no story was found, it can be concluded that the 'copy-and-narration' Will only help bind intelligibility when it is there, not enhance closure⁷. One could start by looking into the gradual out-facing of abstraction in apparent behaviour and its semantics by introducing clearer indexical and iconic figures, aiming towards a more mimetic structure⁸. Alternatively, [van Buren and Scholl \(2017\)](#) suggested that the Wolfpack effect specifically was a function which could be reinforced. It is currently unknown if a lack of understanding for the specific perception of causality functions used could have had an influence on the closure. One could therefore look into what can be achieved through early pragmatism by reinforcing certain functions before the application, instead of just teaching controls.

Sum-up

In this chapter, a discussion of the success of the problem statement is presented. The lack of ability to reject the first null-hypothesis: *"No story is found"*, and the somewhat confident rejection of the second: *"There is no consistency between which narrative the audience perceives"*, culminated in the ability to say that apparent behaviour needs a lot

⁷[Bruni and Baceviciute \(2013\)](#) makes the excellent point that closure precedes intelligibility. For interpretation to matter one therefore first needs closure.

⁸Didascalie, obvious

of work if it is to work as a graphical framework for in narratives. The type of narrative was tamed, but a narrative existing at all is in-consistent.

Finally, the future work regarding both the methodology for testing intelligibility as well as how to increase closure was presented.

The last part will present a summation of all the work presented in this thesis, and conclude this project.

Part IV

The End

Chapter 9

Conclusion

The goal of this project was to create a stimulant for apparent behaviour, meant to stabilise the level of intelligibility and closure an audience perceives through it, as apparent behaviour is at our current state of understanding, highly erratic.

As a result, I created an Interactive Narrative Application using the sociological Phenomenon Apparent Behaviour, helped along by Perception of Causality research.

As an attempt to both start development of a less finicky and expensive framework than current IN research has a tendency to employ today (and to show current the IN-field that such things can actually work), the rationale behind how Apparent Behaviour could be seen as a abstract form of discourse, when looking at the ontological abstraction from semiotics, was detailed in full.

Likewise, the need to tame and test the highly unpredictable and unstable fluctuations of both closure and intelligibility was described, and at last a final problem statement was proposed: *“How can Apparent Behaviour be used in an interactive narrative context, where a story is interpreted with a general level of intelligibility towards the author’s intention?”*.

Following both the proposed design of a remediation of Plato’s republic in part II, as well as the test of said application and results thereof in part III; It can be said that the answering of the problem statement was not entirely met.

Even given the ‘copy and narration’ method employed to attempt to use relevant quotes of text in the application to bind the narrative proved ineffective to heighten the level of closure to a manageable degree. Thereby the first null hypothesis: *“No story is found”* could not be dismissed.

More luck was had with intelligibility in the small sample of participants who did experience closure, though. They all kept to the theme of democracy, though some seemed to miss the quite sinister tone the application attempted. Thereby the second null-hypothesis: *“There is no consistency between which narrative the audience perceives”* shows promise for a rejection, if a non-qualitative methodology for it’s evaluation was found.

Ultimately, though, the ‘slap-on narrative’ approach described and attempted did not work for this application and the problem statement must be concluded to stand unsolved.

Further work will have to be conducted in order to stabilise and press closure onto apparent behaviour in any reliant degree. Perhaps the application attempted was flawed? Or maybe one needs to look into fazing out the abstraction with more recognisable sign systems.

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Appendix A

Questionnaire

Asterix * indicates a required question.

[Square brackets enclose response-types and special functionality.]

Text in italic describes a description to a page or question.

Pre-experience

Page 1

- Q 1: Were you hired through the prolific questionnaire?[Radio]*
 - Yes [Go to [A](#)]
 - No [Go to [A](#)]

Page 2

- Q 2 : Please insert your participant ID. [Text input: Go to [A](#)]*

Page 3: Please fill out the following before playing.

- Q 3 : Age. [Number input]*
- Q 4 : Gender. [Radio]*
 - Male
 - Female
 - Prefer not to say
 - Other [Specify].
- Q 5 : Profession. [Text Input]*

During experience

Page 4: Play time!

Please play the game at the bottom of this page (you will have to scroll down) and proceed here when you have finished.

Page 5: Did you finish the game?

- Q 6 : Please choose yes if you finished the game. [Radio]*
 - Yes.
 - No. [Go to [A](#)]

Post experience

Page 6: What happened

- Q 7 : Please write what happened in the game. [Text input]*

Page 7: Preference

- Q 8 : Please indicate whether you like the game or not [Likert 1-5]*
 - Disliked it
 - Liked it
- Q 9 : Why/Why not? [Text input]
- Q 10 : How were controlling the character to you? [Likert 1-5]*
 - I had problems controlling my character
 - I had no problems controlling my character
- Q 11 : If you had problems with control, when and how? [Text input]*
(Write "I had no problems" if you had no problems)

Page 8: Please indicate how much you agree with the following statement.

- Q 12 : Objects existed in the game, and they changed over time. [Likert 1-5]*
Changed means that they moved, changed shape, color, etc. over time.
 - Completely disagree
 - Completely agree
- Q 13 : If any, how? [Text input]

Page 9: Please indicate how much you agree with the following statement.

- Q 14 : Some actions were caused by other things in the game. [Likert 1-5]*
This means that there was a (physical) cause-and-effect to some movements. Etc. recoil from a hit, bouncing off a surface.
 - Completely disagree
 - Completely agree
- Q 15 : If any, which? [Text input]

Page 10: Please indicate how much you agree with the following statement.

- Q 16 : There were conscious agents in the game. [Likert 1-5]*
This could mean that some conscious entities existed (anything able of thought or emotion: People, animals, etc.)
 - Completely disagree
 - Completely agree
- Q 17 : If any, which? [Text input]

Page 11: Please indicate how much you agree with the following statement.

- Q 18 : The conscious agents in the game made purposeful actions. [Likert 1-5]*
This could be a character hitting another out of anger, one dealing money, one eating because of hunger, etc.
 - Completely disagree
 - Completely agree
- Q 19 : If any, which? [Text input]

Page 12: Please indicate how much you agree with the following statement.

- Q 20 : Things happened as a chain of events where one caused the next. [Likert 1-5]*
 - Completely disagree
 - Completely agree
- Q 21 : If yes, how? [Text input]

Page 13: Please indicate how much you agree with the following statement.

- Q 22 : There was a overall theme of story. [Likert 1-5]*
In as sense where the whole thing had something meaningful to tell. Did it have a moral?
 - Completely disagree
 - Completely agree
- Q 23 : If any, which? [Text input]

Page 14: How visible was the following?

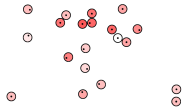
During the game, when you played it.

- Q 24 : Objects existed in the game, and they changed over time. [Likert 1-5]*
 - I never saw it
 - It was obvious all the time
- Q 25 : Some actions were caused by other things in the game. [Likert 1-5]*
A (physical) cause-and-effect to some movements. Etc. recoil from a hit, bouncing off a surface.
 - I never saw it
 - It was obvious all the time
- Q 26 : There were purposeful actors in the game. [Likert 1-5]*
This could mean that some conscious entities existed (anything able of thought or emotion: People, animals, etc.)
 - I never saw it
 - It was obvious all the time
- Q 27 : The conscious agents in the game made purposeful actions. [Likert 1-5]*
 - I never saw it
 - It was obvious all the time
- Q 28 : Things happened as a chain of events where one caused the next. [Likert 1-5]*
 - I never saw it
 - It was obvious all the time
- Q 29 : There was a overall theme of story (Moral). [Likert 1-5]*
 - I never saw it
 - It was obvious all the time

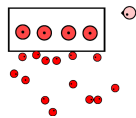
Page 15: Please indicate when you first noticed the following.

- Q 30 : Objects existed in the game, and they changed over time. [Radio]*

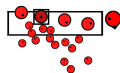
- Never
- Tutorial
- Scene 1



- Scene 2



- Scene 3



- Scene 4



- Q 31 : Some actions were caused by other things in the game. [Radio]*

A (physical) cause-and-effect to some movements. Etc. recoil from a hit, bouncing off a surface.

- [Same as question 30]

- Q 32 : There were purposeful actors in the game. [Radio]*

This could mean that some conscious entities existed (anything able of thought or emotion: People, animals, etc.)

- [Same as question 30]

- Q 33 : The conscious agents in the game made purposeful actions. [Radio]*

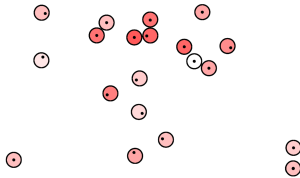
- [Same as question 30]

- Q 34 : Things happened as a chain of events where one caused the next. [Radio]*
 - [Same as question 30]
- Q 35 : There was a overall theme of story (Moral). [Radio]*
 - [Same as question 30]

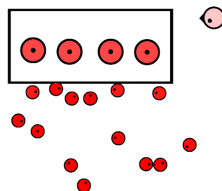
Page 16: Quotes

What did each quote mean to you?

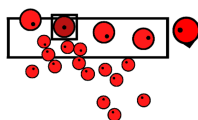
- Q 36 : Mob rule [Democracy] is a rough sea for the ship of state to ride; every wind of oratory stirs up the waters and deflects the course. [Text input]*



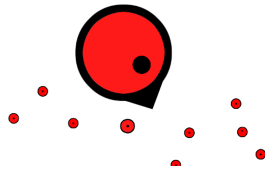
- Q 37 : [Demagogues] are like the fishers for eels; in still waters they catch nothing, but if they thoroughly stir up the slime, their fishing is good; in the same way it's only in troublous times that you line your pockets. [Text input]*



- Q 38 : What is a demagogue? He is a politician skilled in oratory, flattery and invective; evasive in discussing vital issues; promising everything to everybody; appealing to the passions rather than the reason of the public; and arousing racial, religious, and class prejudices; a man whose lust for power without recourse to principle leads him to seek to become a master of the masses. [Text input]*



- Q 39 : Democracy has never been and never can be so durable as aristocracy or monarchy; but while it lasts, it is more bloody than either. ... Remember, democracy never lasts long. It soon wastes, exhausts, and murders itself. There never was a democracy yet that did not commit suicide. [Text input]*



Page 17: How relevant do you think the quotes were to the game?

- Q 40 : Mob rule [Democracy] is a rough sea for the ship of state to ride; every wind of oratory stirs up the waters and deflects the course. [Likert 1-7]*
 - Very irrelevant
 - Very relevant
- Q 41 : If it was relevant at all, when did you realize? [Radio]*
 - Was not relevant
 - When it appeared
 - Later in the game
 - After the game
- Q 42 : [Demagogues] are like the fishers for eels; in still waters they catch nothing, but if they thoroughly stir up the slime, their fishing is good; in the same way it's only in troublous times that you line your pockets. [Likert 1-7]*
 - Very irrelevant
 - Very relevant
- Q 43 : If it was relevant at all, when did you realize? [Radio]*
 - Was not relevant
 - When it appeared
 - Later in the game
 - After the game

- Q 44 : What is a demagogue? He is a politician skilled in oratory, flattery and invective; evasive in discussing vital issues; promising everything to everybody; appealing to the passions rather than the reason of the public; and arousing racial, religious, and class prejudices; a man whose lust for power without recourse to principle leads him to seek to become a master of the masses. [Likert 1-7]*
 - Very irrelevant
 - Very relevant
- Q 45 : If it was relevant at all, when did you realize? [Radio]*
 - Was not relevant
 - When it appeared
 - Later in the game
 - After the game
- Q 46 : Democracy has never been and never can be so durable as aristocracy or monarchy; but while it lasts, it is more bloody than either. ... Remember, democracy never lasts long. It soon wastes, exhausts, and murders itself. There never was a democracy yet that did not commit suicide. [Likert 1-7]*
 - Very irrelevant
 - Very relevant
- Q 47 : If it was relevant at all, when did you realize? [Radio]*
 - Was not relevant
 - When it appeared
 - Later in the game
 - After the game

Page 18: Closing

- Q 48 : How would you play a second time? [Text Input]
- Q 49 : Do you have any closing comments? [Text Input]
Anything at all

Appendix B

Questionnaire Responses

Q 7 : What happened

- p1 I have no idea. There was red circles and a story about democracy and sailing.
- p2 I bounced a ball with a + sign off of other balls. John Adams quotes and other quotes about democracy were flash on screen.
- p3 Several levels of intelligent "cells" some of which you could alter their behaviour, interspersed with quotes about the nature of democracy
- p4 I get to control a ball (sometimes) and interact with other balls but I don't know what exactly happens. And in between scenes there's a new quote about democracy/demagogues.
- p5 The game presented small point-and-click scenarios interspersed by quotes on democracy.
- p6 i found it very confusing but i think i moved around and followed the other red things
- p7 The small circles starting attacking the bigger ones.
- p8 Circles which you could click or right click on with a further option. Interspersed with quotes about demigogues.
- p9 I'm not sure. You click the circles, and once a goal is reached (e.g. turn all circles into a certain colour), a quote relating to politics and philosophy seems to appear.
- p10 Some bubbles moved around the screen.
- p11 One of the red circles turned huge and the smaller ones couldn't fight it.

- p12 Balls moved around
- p13 there was lots of little demagogues that i think represented people and different types of rule over the years. They all seems to get lured to a leader of some type
- p14 I have absolutely no idea. The game made no sense to me whatsoever & the tutorial did not explain it. A number of circles with dots in them pushed my circle around & eventually pushed it out of a rectangle at the top of the screen. Every now & then the game paused & a quote about democracy was displayed.
- p15 Circles fought other circles and quotes about democracy appeared.
- p16 you followed fellow balls around while quotes appeared describing demagogues and democracies. The game seemed to parallel the quotes to a degree.
- p17 There were 2 circles, one with a cross and one with a dot. They chased each other in different ways depending on whether I clicked the left or the right mouse. The colour of the dot one changed. it started pink and then got deeper until it was red. Even if I separated the circles, they drifted together again.
- p18 Lots of circles, sometimes red, sometimes turned green. Also interrupted by sayings from famous people
- p19 The big won over the small
- p20 A game about circle characters pushing and showing anger towards other circle characters
- p21 The circles were moving about with one following the other when I clicked
- p22 It didn't make any sense to me. Sonething to do with democracy and the monarchy. Democracy is a troubled state.
- p23 The little circles clashed with each other for a while, gradually changing colors until some were red. Some of the circles were trapped in boxes. One of the circles was bigger than the other circles and had a triangle attached to it. That circle was hitting the boxes and in some way affecting the other circles. In between scenes of the game there were quotes about democracy and political stuff.
- p24 It appeared that where I clicked on screen, at least one of the red balls followed
- p25 I came to a section where all of the circles are red with a black dot. There were 4 larger circles in a rectangle. There was 5th large circle outside the rectangle that looked like it had a beak. There were also lots of little red dots. I experimented with moving around and clicking on dots. I could cause the small dots to move

and I could cause the dot on each circle to turn green but I couldn't find any way to make an real progress in the game.

p26 I have no idea what the game was supposed to be. Just a bunch of red balls repeatedly running into each other and vague quotes on the screen.

p27 I can honestly say I have no clue. There were a ton of dots and a lot of text about democracy.

p28 I was the circle with the plus sign, and I was to follow the other circle.

p29 You play as a ball who is a nobody while the story describes a demagogue. The ball grew until it eventually 'died' (became black). Then a larger red ball crushes all the remaining other balls, much like a tyrant.

p30 I'm not entirely sure, the little circles moved around the screen interspersed with quotes about democracy

Q 8 : Please indicate whether you like the game or not

[p1] 2 [p2] 2 [p3] 2, [p4] 2 [p5] 2 [p6] 1 [p7] 4 [p8] 1 [p9] 2 [p10] 1 [p11] 3 [p12] 1 [p13] 2
[p14] 1 [p15] 2 [p16] 4 [p17] 4 [p18] 1 [p19] 4 [p20] 3 [p21] 3 [p22] 1 [p23] 1 [p24] 1 [p25]
1 [p26] 1 [p27] 1 [p28] 3 [p29] 2 [p30] 3

Q 9 : Why/Why not?

p1 I didn't understand it

p2 It was not all that fun or interesting

p3 There wasn't much interaction

p4 I don't like it because I don't understand what's going on and how it is related to the quotes.

p5 The game did not seem to have a clear purpose.

p6 very confusing

p7 it was interesting

p8 Did not understand what was happening at all.

p9 I didn't understand the game and therefore did not like it

p10 I did not know what to do, did not influence, was not involved or engaged.

p11 Controls were kind of slow to respond. I liked the meaning of the game, though.

p12 It made no sense.

p13 It was kind of strange, and took a while to understand what was happening

p14 I had no idea what was going on.

p15 It didn't make sense.

p16 yes it was simple but powerful like something like the game called life

p17 It was quirky and I was not sure what was going to happen next.

p18 Didn't understand it

p19 Looked interesting and I like the quotes

p20

p21 It was ok but a bit boring

p22 Not sure what the aim of it was.

p23 Wasn't a fun game. Instructions weren't very clear as to how to control character or what the point of the game was.

p24 There were no objectives, goals given

p25 It wasn't made clear what I should try to accomplish and what I could do wasn't enjoyable.

p26 It didn't make sense and there wasn't any meaningful gameplay

p27 It wasn't fun, there was no clear objective, and all of the things about democracy felt really distopian and weird. I felt like my computer was going to crash or something.

p28 It was a little confusing the follow.

p29 I didn't get the plot or the point of the story. In some 'slides' my character did not even exist.

p30 didn't understand what I was doing

How were controlling the character to you?

[p1] 3 [p2] 4 [p3] 2 [p4] 2 [p5] 2 [p6] 2 [p7] 4 [p8] 1 [p9] 3 [p10] 1 [p11] 3 [p12] 4 [p13] 1
[p14] 1 [p15] 5 [p16] 4 [p17] 3 [p18] 1 [p19] 4 [p20] 2 [p21] 1 [p22] 1 [p23] 2 [p24] 2 [p25]
5 [p26] 3 [p27] 3 [p28] 5 [p29] 5 [p30] 1

Q 11 : If you had problems with control, when and how?

p1 It was slow

p2 I had no problems

p3 I could alter what they could do but didn't really understand the objectives

p4 Sometimes I don't have a character to control. And I don't understand what controlling the character does e.g. when I right click on another ball, I don't know what actions will be carried out.

p5 The character sometimes became stuck/trapped by walls and other NPCs.

p6 sometimes it didnt move at the end of the game

p7 I had no problems

p8 I kept clicking but they weren't doing anything. Occasionally let me select an option.

p9 I wasn't always sure what I should do in order to complete the game, so while I could control the character, I didn't really know why...often irrelevant objects were in my way.

p10 My actions did not appear to change anything.

p11 Not a major problem, just a little movement lag when I clicked.

p12 I had no problems

p13 it just seems to go all over the place once i had located it

p14 Sometimes my character responded to my mouse strokes & other times it didn't. It was also pushed around easily by the other characters.

p15 I had no problems

p16 i had no problems

p17 Sometimes the speed of the circles changed so it was difficult to catch one to click on it.

p18 Didn't seem to move where I wanted it to

p19 I had no problems

p20 I feel it wasn't that responsive, but it wasn't too bad.

p21 I had no problems

p22 Not sure what the aim was

p23 Instructions were somewhat unclear.

p24 At the start of each phase, I clicked on screen and the reaction of the balls was delayed by a few seconds.

p25 N/A

p26 I had no problems

p27 Reaction time was a bit off when I was trying to move my character

p28 I had no problems

p29 I had no problems

p30 didn't really seem to respond, it moved in different ways depending on where I click but not sure where it needed to go

Q 12 : Objects existed in the game, and they changed over time

[p1] 5 [p2] 4 [p3] 4 [p4] 5 [p5] 5 [p6] 2 [p7] 4 [p8] 4 [p9] 5 [p10] 3 [p11] 5 [p12] 3 [p13] 4
[p14] 5 [p15] 5 [p16] 4 [p17] 4 [p18] 5 [p19] 4 [p20] 5 [p21] 5 [p22] 5 [p23] 5 [p24] 4 [p25]
5 [p26] 4 [p27] 5 [p28] 5 [p29] 5 [p30] 5

Q 13 : If any, how?

p1 Changed red

p2 the became less individual

p3 It was hard to understand

p4 Sometimes they get bigger. Sometimes I get bigger and the other object gets smaller. They knock into each other and move.

p5 The characters moved and interacted.

p6

p7 some got more red and some got bigger.

p8 By hitting each other the circles turned red. Smaller circle grew into a bigger circle with an arrow which would hit other ones.

- p9 The objects were the circles. Sometimes the objects were bounded by boxes, sometimes they appeared programmed to perform certain duties (randomly move or vibrate methodologically).
- p10 They move about.
- p11 The objective circles turned red and got larger in each stage.
- p12 Behavior
- p13 they changed colour and also changed size
- p14 Objects changed in size & colour.
- p15 Some became smaller/larger, some became a deeper red.
- p16 some balls became protected others grew larger
- p17 The colours of the outer rim of the circles and inside the circles changed - from black to green and from pink to red.
- p18 turned red, changed size
- p19 More and more
- p20 The circle changed colors. Using to either red or black
- p21 One turned pink and green
- p22 they changed shape and colour, and were grouped together differently
- p23 The circles changed colors, got bigger, changed shape (one had a triangle attached to it).
- p24 They changed colour, to black and stopped moving.
- p25 Some got larger, one had a beak, all of them turned from white to red.
- p26 They changed shape and color
- p27 colors of other dots changed, each screen looked different, they moved
- p28 The increased in size, some increased in numbers and some decreased in numbers
- p29 Your ball increases in size, then it vanishes. Other balls increase in size and become redder.
- p30 each Time the seemed to change how they behaved in relation to each other

Q 14 : Some actions were caused by other things in the game

[p1] 5 [p2] 4 [p3] 4 [p4] 4 [p5] 5 [p6] 5 [p7] 5 [p8] 4 [p9] 5 [p10] 3 [p11] 3 [p12] 2 [p13] 4
 [p14] 5 [p15] 5 [p16] 3 [p17] 4 [p18] 3 [p19] 4 [p20] 5 [p21] 5 [p22] 5 [p23] 4 [p24] 5 [p25]
 5 [p26] 5 [p27] 5 [p28] 5 [p29] 5 [p30] 5

Q 15 : If any, which?

p1 Bumping into things

p2 The ball would cause other to stick together

p3 The way the different cells interacted with each other

p4 When an object with a beak (?) knocks on the box, the objects in the box rattles?

p5 One character broke others out of a box or prison.

p6 the small red circles bounced off of each other

p7 the circles got together and starting changing colour.

p8 Turning redder when hitting each other.

p9 Hitting one circle against the other would cause the circles to bounce off each other, and in that way actions had a cascading effect.

p10 I wasn't sure, I suspected not.

p11 I didn't notice that I caused anything to happen, except when I right-clicked.

p12

p13 there seemed to be some fighting that repelled some of the circles

p14 My counter was pushed around by the other counters. Also, on occasion, I was able to push some of the counters around too.

p15 Circles recoiled from each other when they collided.

p16 you could affect the various scenarios with your movements

p17 I'm not sure but I think it was to do with the speed the circles hit each other caused them to stick or not stick.

p18 some circles moved when hit

p19 Bouncing, recoil

p20 objects could push other objects or change their colors

p21 left clicking made one object follow the other

p22 sometimes they recoiled, sometimes they were attracted to each other

p23 When one of the circles 'hit' the edge of a square, the square moved and the circles inside the square moved too. Circles changed colors and seemed to move in an agitated way when hit by other circles.

p24 When I clicked on screen some of the objects followed in that direction.

p25 I could use the movable red dot to chase other around, If I repeatedly bounce it off another object it would bounce.

p26

p27 The other characters were bouncing off of each other and moving in similar directions

p28 When one circle hit against the square surface it opened up.

p29 If you hit another ball with your ball, it would push them away. You could also make other balls black.

p30 when they hit each other they would bounce off and change more red the more times they hit

Q 16 : There were conscious agents in the game

[p1] 1 [p2] 3 [p3] 4 [p4] 3 [p5] 1 [p6] 1 [p7] 4 [p8] 4 [p9] 1 [p10] 1 [p11] 1 [p12] 2 [p13] 4
[p14] 1 [p15] 2 [p16] 2 [p17] 1 [p18] 1 [p19] 2 [p20] 5 [p21] 1 [p22] 1 [p23] 1 [p24] 2 [p25]
5 [p26] 1 [p27] 1 [p28] 1 [p29] 4 [p30] 4

Q 17 : If any, which?

p1

p2 I don't know

p3 The little cells had behaviour

p4 It feels like the one with the beak is sentient and trying to do something.

p5

p6

p7 some of the circles wanted to attack the bigger ones.

p8 Bigger red circle with arrow trying to access the box of other circles.

p9 It didn't seem like there were, only preprogrammed circles.

p10 That did not seem to be the case.

p11 All I saw were circles and squares around them.

p12

p13 there seemed to be an overall leader/leaders

p14 There were no conscious entities. It seemed very random.

p15

p16 there was maybe some autonomy but not conscious agents

p17 No, there were no conscious agents (apart from myself).

p18

p19 in the last part , the left ones

p20 The circles. They acted like people.

p21

p22 none

p23

p24 I do not believe so

p25 The eyes on the small red dots would look in different directions as a response to the red dot that I controlled.

p26

p27

p28 I don't believe there were any

p29 I believe the last ball we see (the very large red one) was conscious, but apart from your own player ball, there weren't many other conscious agents.

p30 seemed to move toward a certain point

Q 18 : The conscious agents in the game made purposeful actions.

[p1] 1 [p2] 4 [p3] 2 [p4] 1 [p5] 1 [p6] 2 [p7] 4 [p8] 4 [p9] 1 [p10] 1 [p11] 1 [p12] 2 [p13] 5
 [p14] 1 [p15] 2 [p16] 3 [p17] 1 [p18] 1 [p19] 1 [p20] 5 [p21] 1 [p22] 1 [p23] 1 [p24] 1 [p25]
 5 [p26] 3 [p27] 1 [p28] 3 [p29] 5 [p30] 1

Q 19 : If any, which?

p1

p2 They stuck together

p3

p4

p5

p6

p7 attacking certain circles.

p8 Trying to access the box and then later hitting smaller circles with its arrow.

p9 Again, I did not believe there were conscious agents.

p10 I could not determine anything discernible of that nature.

p11 I didn't see any purposeful actions.

p12

p13 yes some of the leaders seems to almost put down an uprising

p14 The actions seemed purposeless to me.

p15

p16 towards the end of the game things seemed a little less random

p17 The only conscious agent was myself and I did not act out of anger or other extreme emotion.

p18 there were none

p19

p20 They seem to showcase communication and anger.

p21

p22 none

p23

p24 I did not notice this

p25 They would look in different directions and they would flee and hide in corners.

p26

p27

p28 When hitting another circle

p29 They 'killed' the smaller larger balls and then became the largest ball which crushed the other small ones.

p30 not that I could tell

Q 20 : Things happened as a chain of events where one caused the next

[p1] 5 [p2] 4 [p3] 4 [p4] 3 [p5] 1 [p6] 5 [p7] 5 [p8] 4 [p9] 5 [p10] 1 [p11] 3 [p12] 2 [p13] 1
[p14] 4 [p15] 1 [p16] 3 [p17] 3 [p18] 2 [p19] 5 [p20] 4 [p21] 5 [p22] 5 [p23] 3 [p24] 4 [p25]
5 [p26] 2 [p27] 2 [p28] 5 [p29] 5 [p30] 1

Q 21 : If yes, how?

p1 Bumping into each other created more red circles

p2 If one ball was struck it would sometimes move to strike others

p3 It seemed like the different levels led into each other

p4 Not sure.

p5

p6 one red thing moved then others did too

p7 as soon as the wall surrounding the big circles colaspe all the smaller circles attacked.

p8 Circles joining, getting bigger and redder.

- p9 It was all deterministic: the result of one action (e.g. hitting ball A against ball B) was directly responsible for subsequent actions (e.g. ball B hitting ball C).
- p10 I did not perceive that was happening.
- p11 I guess the circles got larger because of what happened in the previous stage.
- p12
- p13 i didn't notice a chain of events
- p14 One object pushing another seemed to cause a knock-on effect where other objects would move around & sometimes bounce off the edges of the playing surface.
- p15
- p16 there were implications that certain balls were gaining power
- p17 The rate of colour change seemed to be linked to the amount of hitting or sticking together of the circles.
- p18 I was not aware of change of events
- p19 domino effect
- p20 There was some kind of story going on in the game, but I couldn't tell what was happening. It seems like some objects were angry for some reason, and they got punished in the end by a "huge" object.
- p21 One object followed the other very closely
- p22 on one of the levels, bouncing off one target caused all of the others to move
- p23 It seemed that some events caused other events. Circles hitting each other caused color changes. The one bigger circle hitting the square caused it to break.
- p24 One object followed another and so on. and then they all also changed colour and stopped moving.
- p25 By pushing the mother hen it finally progressed to page where it seemed the chicks gathered around the mother hen.
- p26
- p27 Movements of different characters effected others
- p28 When one circle was followed or hit, it made the screen completely change.

p29 My ball could blacken other balls, the destruction of the democracy (box with 4 large balls in it) was caused by the 'woodpecking' red ball, who later became a tyrant after the downfall of democracy.

p30 did not notice this to happen

Q 22 : There was a overall theme of story

[p1] 3 [p2] 4 [p3] 4 [p4] 2 [p5] 3 [p6] 2 [p7] 5 [p8] 1 [p9] 3 [p10] 1 [p11] 3 [p12] 2 [p13] 4 [p14] 2 [p15] 2 [p16] 4 [p17] 1 [p18] 1 [p19] 4 [p20] 4 [p21] 1 [p22] 5 [p23] 3 [p24] 2 [p25] 3 [p26] 1 [p27] 5 [p28] 4 [p29] 5 [p30] 1

Q 23 : If any, which?

p1 I have no idea

p2 Democracy and demagogue

p3 It seemed like there was a story arc, somehow related to democracy/authority

p4 Didn't get the story at all (if there was one)

p5 The story seemed to be somewhat guided by the quotes and the themes of democracy.

p6

p7 small guys getting together to attack the bigger circles

p8 haven't a clue.

p9 I think that the quotes that were given told an overall political and philosophical narrative that was probably meant to be represented by the events in the game, although it was not clear to me what that narrative was (individualism vs consensus? cooperation vs chaos?)

p10 It all looked random.

p11 There was narrative text about corrupt politicians.

p12

p13 I think it was all do with people and overall rulers

p14 I didn't notice any story. It seemed random to me.

p15

p16 possibly it started with anarchy/freedom and ended with a all powerful ball

p17 There was no overall theme that I was aware of.

p18 I could not see any story to the game

p19 a small war

p20 It seems like there was, but it was hard to tell (from my point of view) what was really happening.

p21

p22 There was a moral, but I didn't quite understand it - to do with democracy destroying itself.

p23 The quotes that showed up in between 'scenes' of the game had an overall political theme.

p24 There was political text, but I did not link it with the game.

p25 If there was a moral it wasn't clear to me though I did read the quotes about demagogues.

p26

p27 Democracy is bad and produces a self destructive society

p28 I think there was a theme. Basically our actions can change events

p29 Though it was confusing at times with the gameplay, the story was a person who broke democracy by killing off the politicians and later became a dictator. The moral was that although democracy is short lived and considered 'modern' it could be very bloody and lead to a country's downfall.

p30

Q 24 : Objects existed in the game, and they changed over time.

[p1] 5 [p2] 3 [p3] 4 [p4] 4 [p5] 5 [p6] 2 [p7] 4 [p8] 4 [p9] 3 [p10] 3 [p11] 5 [p12] 2 [p13] 4 [p14] 4 [p15] 4 [p16] 3 [p17] 4 [p18] 4 [p19] 3 [p20] 3 [p21] 5 [p22] 1 [p23] 4 [p24] 5 [p25] 5 [p26] 2 [p27] 4 [p28] 5 [p29] 4 [p30] 5

Q 25 : Some actions were caused by other things in the game.

[p1] 4 [p2] 4 [p3] 4 [p4] 4 [p5] 4 [p6] 4 [p7] 4 [p8] 4 [p9] 5 [p10] 3 [p11] 3 [p12] 3 [p13] 3
 [p14] 4 [p15] 5 [p16] 3 [p17] 4 [p18] 1 [p19] 3 [p20] 5 [p21] 4 [p22] 4 [p23] 4 [p24] 4 [p25]
 5 [p26] 5 [p27] 5 [p28] 5 [p29] 3 [p30] 4

Q 26 : There were purposeful actors in the game.

[p1] 1 [p2] 3 [p3] 4 [p4] 3 [p5] 3 [p6] 1 [p7] 4 [p8] 3 [p9] 1 [p10] 1 [p11] 1 [p12] 2 [p13] 4
 [p14] 1 [p15] 2 [p16] 3 [p17] 1 [p18] 1 [p19] 3 [p20] 5 [p21] 1 [p22] 1 [p23] 1 [p24] 2 [p25]
 5 [p26] 3 [p27] 1 [p28] 2 [p29] 4 [p30] 2

Q 27 : The conscious agents in the game made purposeful actions.

[p1] 1 [p2] 3 [p3] 4 [p4] 3 [p5] 3 [p6] 2 [p7] 4 [p8] 4 [p9] 1 [p10] 1 [p11] 1 [p12] 2 [p13] 4
 [p14] 1 [p15] 2 [p16] 3 [p17] 1 [p18] 1 [p19] 3 [p20] 5 [p21] 1 [p22] 1 [p23] 1 [p24] 1 [p25]
 4 [p26] 2 [p27] 1 [p28] 4 [p29] 4 [p30] 1

Q 28 : Things happened as a chain of events where one caused the next.

[p1] 4 [p2] 4 [p3] 4 [p4] 2 [p5] 4 [p6] 4 [p7] 4 [p8] 4 [p9] 5 [p10] 1 [p11] 3 [p12] 2 [p13] 4
 [p14] 4 [p15] 2 [p16] 3 [p17] 4 [p18] 1 [p19] 4 [p20] 5 [p21] 5 [p22] 4 [p23] 3 [p24] 5 [p25]
 5 [p26] 1 [p27] 5 [p28] 4 [p29] 5 [p30] 1

Q 29 : There was a overall theme of story (Moral).

[p1] 3 [p2] 4 [p3] 4 [p4] 1 [p5] 2 [p6] 2 [p7] 5 [p8] 1 [p9] 4 [p10] 1 [p11] 3 [p12] 3 [p13] 5
 [p14] 1 [p15] 2 [p16] 4 [p17] 1 [p18] 1 [p19] 3 [p20] 3 [p21] 3 [p22] 4 [p23] 3 [p24] 2 [p25]
 3 [p26] 1 [p27] 4 [p28] 4 [p29] 4 [p30] 1

Q 30 : Objects existed in the game, and they changed over time.

(1 = Never, 2 = Tutorial = 3-6 = Scene 1-4)

[p1] 3 [p2] 4 [p3] 2 [p4] 3 [p5] 3 [p6] 4 [p7] 5 [p8] 3 [p9] 3 [p10] 2 [p11] 2 [p12] 5 [p13] 4
 [p14] 5 [p15] 3 [p16] 5 [p17] 3 [p18] 4 [p19] 3 [p20] 3 [p21] 3 [p22] 4 [p23] 2 [p24] 5 [p25]
 4 [p26] 4 [p27] 3 [p28] 3 [p29] 6 [p30] 3

Q 31 : Some actions were caused by other things in the game.

(1 = Never, 2 = Tutorial = 3-6 = Scene 1-4)

[p1] 3 [p2] 5 [p3] 3 [p4] 3 [p5] 4 [p6] 4 [p7] 5 [p8] 3 [p9] 2 [p10] 1 [p11] 3 [p12] 4 [p13] 3
 [p14] 2 [p15] 4 [p16] 3 [p17] 3 [p18] 1 [p19] 6 [p20] 4 [p21] 5 [p22] 2 [p23] 2 [p24] 3 [p25]
 3 [p26] 3 [p27] 3 [p28] 4 [p29] 5 [p30] 1

Q 32 : There were purposeful actors in the game.

(1 = Never, 2 = Tutorial = 3-6 = Scene 1-4)

[p1] 5 [p2] 5 [p3] 4 [p4] 4 [p5] 4 [p6] 3 [p7] 5 [p8] 3 [p9] 1 [p10] 2 [p11] 1 [p12] 5 [p13] 5
 [p14] 1 [p15] 1 [p16] 6 [p17] 1 [p18] 1 [p19] 5 [p20] 3 [p21] 4 [p22] 1 [p23] 1 [p24] 1 [p25]
 6 [p26] 6 [p27] 1 [p28] 5 [p29] 4 [p30] 1

Q 33 : The conscious agents in the game made purposeful actions.

(1 = Never, 2 = Tutorial = 3-6 = Scene 1-4)

[p1] 6 [p2] 6 [p3] 5 [p4] 4 [p5] 4 [p6] 6 [p7] 5 [p8] 4 [p9] 1 [p10] 2 [p11] 1 [p12] 6 [p13] 6
 [p14] 1 [p15] 1 [p16] 5 [p17] 1 [p18] 1 [p19] 5 [p20] 4 [p21] 4 [p22] 1 [p23] 1 [p24] 1 [p25]
 6 [p26] 1 [p27] 1 [p28] 5 [p29] 4 [p30] 1

Q 34 : Things happened as a chain of events where one caused the next.

(1 = Never, 2 = Tutorial = 3-6 = Scene 1-4)

[p1] 3 [p2] 3 [p3] 5 [p4] 3 [p5] 4 [p6] 5 [p7] 5 [p8] 4 [p9] 2 [p10] 1 [p11] 4 [p12] 5 [p13] 6
 [p14] 3 [p15] 5 [p16] 6 [p17] 3 [p18] 1 [p19] 5 [p20] 4 [p21] 4 [p22] 5 [p23] 4 [p24] 3 [p25]
 5 [p26] 5 [p27] 3 [p28] 6 [p29] 5 [p30] 1

Q 35 : There was a overall theme of story (Moral).

(1 = Never, 2 = Tutorial = 3-6 = Scene 1-4)

[p1] 6 [p2] 6 [p3] 5 [p4] 1 [p5] 6 [p6] 6 [p7] 5 [p8] 1 [p9] 3 [p10] 1 [p11] 4 [p12] 6 [p13] 6
 [p14] 1 [p15] 1 [p16] 6 [p17] 1 [p18] 1 [p19] 5 [p20] 6 [p21] 6 [p22] 3 [p23] 4 [p24] 3 [p25]
 6 [p26] 1 [p27] 2 [p28] 5 [p29] 6 [p30] 1

Q 36 : Mob rule [Democracy] is a rough sea for the ship of state to ride; every wind of oratory stirs up the waters and deflects the course.

- p1 Nothing
- p2 the mob should not rule as it is dangerous
- p3 Democracy has many opinions so a form course is hard
- p4 Mob rule is hard to control. Every little thing that happens can affect it.
- p5 Democracy affects the masses who in turn change it's direction.
- p6 there are a lot of opinions in democracy that stirs up the opinions of public
- p7 people have a breaking point
- p8 Bumping into each other causes anger
- p9 Individualism can corrupt progress without strict rule over it.
- p10 You have a plan but the society you have created has other ideas.
- p11 Democracy is difficult because of the people deciding the rules.
- p12 Everyone pulling in their own direction ultimately impedes progress
- p13 that quote didn't mean anything to me
- p14 Democracy & free speech means you get powerful speakers who can agitate & stir up difficulties during tough times.
- p15 The democratic system often causes unpredictable changes
- p16 democracy increases complexity
- p17 Politicians get carried away when they wield power.
- p18 that things can be a rough ride at times
- p19 Waves does complicate your life
- p20 a mob has the power to change something
- p21 The wind determines the course of actions
- p22 democracy can change the direction of the country
- p23 I would guess that this is supposed to be referencing the game and that this scene is showing a democracy.

p24 I suspected it was a text explanation for what was happening to the objects on screen

p25 Mob rule is turbulent.

p26 Letting the average person vote was a mistake

p27 Democracy is synonymous with mob rule and dissenting actions can effect it.

p28 Things will always get in the way, but you have to tread through

p29 Democracy is a fickle thing and peoples' opinions are easily changed.

p30 nothing can be done without it effecting other things

Q 37 : [Demagogues] are like the fishers for eels; in still waters they catch nothing, but if they thoroughly stir up the slime, their fishing is good; in the same way it's only in troublous times that you line your pockets.

p1 Nothing

p2 demagogues are best to be ignored

p3 Crises are good times for potential tyrants

p4 They only succeed during troubled times by taking advantage of bad times.

p5 Demagogues profit from manipulating the mob.

p6 not sure

p7 war is good for some people

p8 One different one can break down barriers

p9 I wasn't sure. I would guess that it means working as individuals can be aimless and lead to no results, but working together with a purpose can create something very useful.

p10 You need to be interactive to create change.

p11 Some people like to take advantage during bad situations.

p12 Demagogues thrive in more troubled times.

p13 again it meant nothing to me

- p14 Self-interested demagogues thrive during times of uncertainty & change.
- p15 Demagogues profit from stirring up emotion in the masses
- p16 the route to power is panic and confusion
- p17 It's an ill wind that blows no-one any good.
- p18 You can make the best of rough times
- p19 If you look into details you can see more
- p20 Calmness doesn't last for long
- p21 wind is good for them
- p22 Some people take advantage of unrest
- p23 This scene shows a demagogue begin affecting the group.
- p24 This did not have any meaning to me
- p25 Demagogues benefit from creating turmoil.
- p26 Governments are known to harm their own citizens for personal gain
- p27 In order to benefit from society you have to create problems and disruptions, everything cant run smoothly
- p28 You have to push through to find success
- p29 You must take risks to get rewards or see change
- p30 You only make money if you make a mess??

Q 38 : What is a demagogue? He is a politician skilled in oratory, flattery and invective; evasive in discussing vital issues; promising everything to everybody; appealing to the passions rather than the reason of the public; and arousing racial, religious, and class prejudices; a man whose lust for power without recourse to principle leads him to seek to become a master of the masses.

- p1 Nothing
- p2 compliments are not genuine
- p3 A demagogue is a potential tyrant who knows how to stir up the masses

- p4 Politicians basically
- p5 Demagogues are immoral and appeal to the heart rather than the mind.
- p6 that politicians lie and evade answers to get what they want
- p7 anyone can become king
- p8 The actions of one can make a difference
- p9 This quote defined what it meant to be a tyrant, someone who seeks power at no thought of others.
- p10 Waffle.
- p11 This one basically sums up all politicians. They really only want power.
- p12 Demagogues will say anything, while actually **saying** nothing.
- p13 A demagogue reminded me of a Labour party MP or a union leader. They don't have any real purpose in their arguments they just stir up trouble to the masses
- p14 A demagogue craves power for the sake of it & speaks in general terms, avoiding specifics wherever possible. He appeals to people's hearts rather than their minds.
- p15 Explaining how a demagogue manipulates the masses
- p16 a demagogue will do and say anything to reach his goals
- p17 There will always be some people that are power-hungry.
- p18 politicians are skilled people
- p19 Someone with influence
- p20 It's hard to control a mob a people when they're angered
- p21 He stops at nothing to get what he wants
- p22 someone who wants power and control over people
- p23 Still showing the demagogue affecting the group.
- p24 I was not sure why this was said and what it meant
- p25 A demagogue shameless manipulates the masses by appealing to their base emotions.
- p26 The pen is mightier than the sword

p27 Politicians are only after power and will manipulate society and stir up problems just to get and keep it

p28 Sometimes you need someone to take the lead to find your way through

p29 A demagogue is a charismatic man who gains the public's adoration for no tangible reason.

p30 Demagogues will tell you what you want to hear?

Q 39 : Democracy has never been and never can be so durable as aristocracy or monarchy; but while it lasts, it is more bloody than either. ... Remember, democracy never lasts long. It soon wastes, exhausts, and murders itself. There never was a democracy yet that did not commit suicide.

p1 Nothing

p2 democracy has an expiration date

p3 Democracy is doomed to fail

p4 Democracy is difficult to maintain, it is inherently chaotic and self destructs

p5 Democracy is doomed to failure and burns brightly before being replaced.

p6 democracy does not last long as it is not as important as royalty

p7 everything comes to an end

p8 The leader will fight against the smaller ones to their own demise

p9 Democracy may be a powerful too, but eventually it turns on itself and ends.

p10 Pessimistic twaddle.

p11 Democracy can't work because the higher ups always ruin everything.

p12 Democracy is fleeting

p13 I didn't agree with this as i just believe democracy always lives on in a different form

p14 Democracies, by their nature, allow dissention & this eventually causes their downfall.

p15 Every democracy eventually decays

- p16 all good things come to an end
- p17 The king is dead, long live the king.
- p18 democracy is not always good but survives
- p19 There never was democracy it is just an illusion
- p20 All mobs come to an end and democracies don't last that long.
- p21 It will die now that it has what it wants
- p22 democracy is weak
- p23 Showing that the democracy from the first scene has been destroyed.
- p24 I just saw it as a random political line of text, and did not give it any more thought.
- p25 Democracy never last and while it exists it is bloodier than monarch or aristocracy.
- p26 Democratic nations eventually collapse
- p27 Democratic societies are bound to fail, it is inevitable that they self destruct
- p28 When you have too much power, you begin to destroy the things around you.
- p29 Eventually someone in the democracy loses control and takes over as a tyrant, therefore destroying the power of the people and the concept of democracy.
- p30 That democracy will always fail as it always tries to please all the people all the time but can never achieve this

Q 40 : Mob rule [Democracy] is a rough sea for the ship of state to ride; every wind of oratory stirs up the waters and deflects the course.

[p1] 1 [p2] 6 [p3] 6 [p4] 5 [p5] 5 [p6] 5 [p7] 6 [p8] 5 [p9] 7 [p10] 5 [p11] 6 [p12] 4 [p13] 2
[p14] 4 [p15] 3 [p16] 5 [p17] 1 [p18] 4 [p19] 4 [p20] 4 [p21] 5 [p22] 7 [p23] 5 [p24] 2 [p25]
1 [p26] 3 [p27] 1 [p28] 6 [p29] 6 [p30] 1

Q 41 : If it was relevant at all, when did you realise?

(1 = Was not relevant, 2 = When it appeared, 3 = Later in the game, 4 = After the game)

[p1] 1 [p2] 2 [p3] 2 [p4] 4 [p5] 3 [p6] 4 [p7] 2 [p8] 3 [p9] 2 [p10] 2 [p11] 2 [p12] 2 [p13] 1
[p14] 3 [p15] 3 [p16] 2 [p17] 1 [p18] 4 [p19] 3 [p20] 4 [p21] 3 [p22] 4 [p23] 4 [p24] 1 [p25]
1 [p26] 3 [p27] 1 [p28] 3 [p29] 2 [p30] 1

Q 42 : [Demagogues] are like the fishers for eels; in still waters they catch nothing, but if they thoroughly stir up the slime, their fishing is good; in the same way it's only in troublous times that you line your pockets.

[p1] 1 [p2] 6 [p3] 6 [p4] 5 [p5] 5 [p6] 5 [p7] 3 [p8] 6 [p9] 4 [p10] 1 [p11] 5 [p12] 4 [p13] 1
[p14] 2 [p15] 1 [p16] 5 [p17] 1 [p18] 2 [p19] 4 [p20] 5 [p21] 6 [p22] 7 [p23] 5 [p24] 1 [p25]
1 [p26] 1 [p27] 1 [p28] 5 [p29] 3 [p30] 1

Q 43 : If it was relevant at all, when did you realise?

(1 = Was not relevant, 2 = When it appeared, 3 = Later in the game, 4 = After the game)

[p1] 1 [p2] 2 [p3] 2 [p4] 4 [p5] 3 [p6] 4 [p7] 3 [p8] 2 [p9] 2 [p10] 1 [p11] 2 [p12] 3 [p13] 1
[p14] 1 [p15] 1 [p16] 3 [p17] 1 [p18] 4 [p19] 3 [p20] 4 [p21] 3 [p22] 4 [p23] 4 [p24] 1 [p25]
1 [p26] 1 [p27] 1 [p28] 3 [p29] 4 [p30] 1

Q 44 : What is a demagogue? He is a politician skilled in oratory, flattery and invective; evasive in discussing vital issues; promising everything to everybody; appealing to the passions rather than the reason of the public; and arousing racial, religious, and class prejudices; a man whose lust for power without recourse to principle leads him to seek to become a master of the masses.

[p1] 1 [p2] 6 [p3] 6 [p4] 5 [p5] 5 [p6] 2 [p7] 5 [p8] 5 [p9] 6 [p10] 1 [p11] 6 [p12] 4 [p13] 5
[p14] 2 [p15] 1 [p16] 6 [p17] 1 [p18] 2 [p19] 4 [p20] 5 [p21] 5 [p22] 7 [p23] 5 [p24] 1 [p25]
1 [p26] 6 [p27] 1 [p28] 6 [p29] 5 [p30] 1

Q 45 : If it was relevant at all, when did you realise?

(1 = Was not relevant, 2 = When it appeared, 3 = Later in the game, 4 = After the game)

[p1] 1 [p2] 2 [p3] 2 [p4] 4 [p5] 3 [p6] 1 [p7] 2 [p8] 2 [p9] 2 [p10] 1 [p11] 2 [p12] 3 [p13] 3
[p14] 1 [p15] 1 [p16] 3 [p17] 1 [p18] 4 [p19] 4 [p20] 2 [p21] 3 [p22] 4 [p23] 4 [p24] 1 [p25]
1 [p26] 2 [p27] 4 [p28] 3 [p29] 3 [p30] 1

Q 46 : Democracy has never been and never can be so durable as aristocracy or monarchy; but while it lasts, it is more bloody than either. ... Remember, democracy never lasts long. It soon wastes, exhausts, and murders itself. There never was a democracy yet that did not commit suicide.

[p1] 1 [p2] 7 [p3] 6 [p4] 6 [p5] 6 [p6] 4 [p7] 6 [p8] 4 [p9] 2 [p10] 1 [p11] 6 [p12] 2 [p13] 7
[p14] 2 [p15] 2 [p16] 5 [p17] 1 [p18] 5 [p19] 5 [p20] 6 [p21] 7 [p22] 7 [p23] 5 [p24] 1 [p25]
1 [p26] 7 [p27] 1 [p28] 6 [p29] 7 [p30] 1

Q 47 : If it was relevant at all, when did you realise?

(1 = Was not relevant, 2 = When it appeared, 3 = Later in the game, 4 = After the game)

[p1] 1 [p2] 2 [p3] 2 [p4] 4 [p5] 2 [p6] 4 [p7] 2 [p8] 3 [p9] 1 [p10] 1 [p11] 2 [p12] 4 [p13] 2
[p14] 1 [p15] 3 [p16] 4 [p17] 1 [p18] 4 [p19] 4 [p20] 2 [p21] 4 [p22] 4 [p23] 4 [p24] 1 [p25]
1 [p26] 1 [p27] 1 [p28] 3 [p29] 2 [p30] 1

Q 48 : How would you play a second time?

p1 I wouldn't.

p2 not sure maybe try moving things around differently

p3 I'd need more goes to work it out

p4 Trying to avoid getting boxed in

p5 I would focus more closely on the options presented by right clicking and how these relate to the themes.

p6 i would play with a better understanding

p7 the same

p8 I wouldn't. Don't think anything I did made a difference.

p9 I would pay better attention to the quotes and see how they relate to the agents in the game.

p10 Look at what happens when I do not interact.

p11 Would try to click on different things next time.

p12 I wouldn't

p13 yes - to follow it extra closely

p14 I'm not sure. I'd need to understand what was happening more.

p15

p16 with faster clicks and more intent

p17 The same as I played the first time.

p18 try to understand the game more

p19 The same way

p20 I would see if I could stop the mob

p21 Better

p22 Very differently.

p23 I wouldn't.

p24 I would pay more attention to what is affected when I click on screen

p25 I wouldn't play a second time.

p26 I wouldn't.

p27 I would not want to play again

p28 I would make me following moves a little better. Perhaps attempt to stand out.

p29 No - I don't see how I can 'win' so there's no point.

p30 I have know idea

Q 49 : Do you have any closing comments?

p1

p2 no

p3

p4

p5 No.

p6

p7

p8 None

p9 I'm...very confused

p10 N/A

p11 No.

p12

p13 very different than the usual studies - but very interesting

p14 The game was confusing & the tutorial didn't really explain anything. I realise that may have been the point of the survey, but in any case it made playing the game pretty much guesswork.

p15

p16 none

p17 An interesting game.

p18 found the game confusing

p19

p20 None

p21 no

p22 none

p23

p24 I initially tried to run this on Google Chrome, but it said it was incompatible, so I had to run it through Firefox instead.

p25 You should add something like hints to game pages to help participants navigate.

p26 No.

p27 Still have no idea whats going on, tbh I'm kind of alarmed cause this is like one of those movies where the main character (me) unsuspectedly falls into some random game and then they are trapped and don't get out so I hope that doesn't happen. I think the tone of the game is really sinister in a way that made me think something was up. But only because I live in a "democratic" society and the game was basically saying "your world will end!"

p28 n/a

p29 No comment.

p30 none