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A Systematic Literature Review on the Use of Games for Attitude Change: Searching for Factors Influencing Civil Servants' Attitudes

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ABSTRACT

Governments are increasingly using games for civic engagement, decision making, and education. Serious gaming is a type of game that has often been advocated as a means for changing the attitude of its players and can be used for changing the attitude of civil servants. However, the relationship between games and attitude change in civil servants remains unexplored. This paper aims at identifying factors leading to attitude change of civil servants. As hardly any paper is focused on civil servants' attitude change through games, the authors broaden their research to attitude change through games in general. Out of 483 documents, 19 reference papers were analyzed in detail. Eighty-one games were found, and more than 13 different theories were identified containing 30 different influencing factors, which were found mostly to be unrelated and context-dependent. The conceptual dispersion between studies indicates that the resulting overview of factors is a first step towards creating a uniform theory. The results can help governments to design better games.

KEYWORDS

Attitude Change, Civil Servant, E-Government, Game Design, Gaming

1. INTRODUCTION

Governments are increasingly using games for civic engagement, decision-making, policy communication, and in a variety of other areas (Hassan, 2016; Sgueo, 2018; Vasconcellos, Carvalho, & Araujo, 2017). The history of games used in public service dates back centuries, but the importance of such activities has only recently been recognized (Mayer, 2009; McGonigal, 2011; van de Ven, Stubbé, & Hrehovcsik, 2013). Together with this increased practical use of games, understanding is needed to improve the effect of games.

Gaming in governments can be considered as the use of game elements in different aspects of public administration (Janssen & Helbig, 2016; van de Ven et al., 2013). It ranges from complete

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tailor-made interventions for training and decision-making to governmental actions towards engaging citizens, employees, and other public-policy stakeholders (Mayer, 2009; Sgueo, 2018). Studies on policy-gaming, education, and even the use of gamification techniques by governments are well-known.

Games can be used to change servants' attitudes. However, there is a lack of systematic approaches for accomplishing attitude change (Boyle et al., 2016; Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012). Games have been successfully used to change general players' perceptions or even to have them engage in different behaviors, as reported in many studies in various domains (Antle, Tanenbaum, Macaranas, & Robinson, 2014; de Caluwé & Geurts, 1999). This idea originates from an *experiential learning* perspective, which states that attitudes are influenced by experience, and this might lead participants to engage in different behaviors (Kolb, 2000).

Attitude and behavior are closely related, as behavior entails the actual actions, whereas attitude entails the beliefs or opinions of a person towards the actions. Attitudes can be shaped by the experiences in which the desired behavior is practiced. The games that aim at changing players' attitudes can be designed specifically for civil servants, the professionals implementing public policies (Chen & Bozeman, 2014; Nam, 2016). In the face of challenges to the operation of public programs and actions, civil servants tend to stick to their existing habits. Lipsky (1971) already found a "tendency on the part of street-level bureaucrats to develop defense mechanisms in order to reach accommodation and resolution of stress tendencies, that results in a distortion of the perceived reality" (p. 396). More broadly than street-level bureaucrats, we can assume that the resistance to change is a kind of defense mechanism. This behavior is to ensure stability and has the disadvantage that new policies requiring a change of attitudes require great effort. Concrete limitations, such as lack of resources, physical and psychological threats, and ambiguity of role expectations, make change difficult for civil servants.

Willems (2020) found that "the public sector is often typified as being bureaucratic, slow, and inefficient" (p.9). However, he also found that a pro-social motivation on public servants is relevant to understand their behaviors and the perceptions of others towards them (p.19). It may contrast with definitions, such as the ones coming from the Bureau Voting Model, which assumes that government employees always seek an increase in their salary or job security by supporting more substantial budget expenditures (Tepe, 2012).

As suggested by Lipsky, dependence on routines for security, unfamiliarity with new procedures for operating differently, and being shielded from awareness of the impact of one's behavior are major reasons for resisting change. This underscores Gould-Williams (2004) findings that the desires of public managers to enhance civil servants' positive attitudes would make good use of team-working activities with appropriate individual training programs. Hence, resistance to change can be influenced by new experiences. Games can provide these experiences, which can result in attitude change as they offer a safe environment (McGonigal, 2011) for experimentation.

Although there is a growing body of literature on games and advances in theoretical and empirical evidence, there is a gap in respect of the factors through which a game influences attitude change (Blythe & Coventry, 2012; Boyle et al., 2016; Connolly et al., 2012). Chappin, Bijvoet, and Oei (2017, p.558) stated that "there are few hard robust findings on how serious games may cause behavioral change. The reason for that lies in the diversity and complexity of games and the range of different perspectives taken by researchers, which makes it hard to generalize results". There is also previous research on factors influencing attitude change through game; however, this is scattered (Boyle et al., 2016; Connolly et al., 2012; Shi & Shih, 2015). Consequently, a Systematic Literature Review (SLR) can contribute to the identification of factors influencing attitude in general and of civil servants specifically.

SLR is an approach for rigorously reviewing research results aimed at aggregating existing literature on a certain topic (Hoyle, 1984; Kitchenham et al., 2009; Norris & Lloyd, 2006). SLR is based on research questions that direct the summarization efforts (Bakir & Gunduz, 2019; Frisch Aviram, Cohen, & Beeri, 2019). The purpose of this study is to review the state-of-the-art in the

use of serious games to change attitudes. Specifically, it targets exploring which factors can foster changes in civil servants' attitudes.

As the purpose of this paper is to identify factors that influence change in attitude in civil servants through games, the following questions guided our research:

1. What are the factors that can lead to attitude change through games?
2. Which factors influencing attitude change through games can foster civil servants' attitude change?

Whereas the first question is generic, the second question focuses on civil servants.

The rest of the paper is structured as follows: In Section 2, the background of the use of games is presented in order to contextualize the discussion and define the SLR protocol. The SLR methodology, together with the specific protocol defined for the present exercise, comprises Section 3. The selection of papers and the first analysis is presented in Section 4. The focus on influencing factors is resumed in Section 5, Findings. The discussion of these findings is presented in Section 6, where the results are applied to the context of civil servants. Finally, in Section 7, conclusions are drawn.

2. BACKGROUND

Huizinga (1949), in his seminal study *Homo Ludens*, defined play as “a voluntary activity or occupation executed within certain fixed limits of time and place, according to rules freely accepted but absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy and the consciousness that it is ‘different’ from ‘ordinary life’” (p.28). Games are a particular kind of play where the players voluntarily join an activity with a defined goal, whether explicit or not, involving mechanics (rules) that result in dynamics that can be monitored through a feedback system (Abt, 1987; Duke & Geurts, 2004; McGonigal, 2011).

Games can provide a safe environment where players get feedback from voluntary interaction with a plot and assets built up of unnecessary challenges (Duke & Geurts, 2004; McGonigal, 2011). They can be used for many purposes, from pure entertainment to decision-making facilitation (Boyle et al., 2016; Connolly et al., 2012). Likewise, serious games are a set of games related to non-entertainment purposes such as learning, policy-making, or designing complex systems (Abt, 1987; Djaouti, Alvarez, Jessel, & Rampnoux, 2011; S Meijer, Reich, & Subrahmanian, 2014). Games can provoke attitude change in its participants, generating new meanings and relations between players and tasks (Geurts, & Vermeulen, 2007; Kriz, 2009; S Meijer et al., 2014; van de Ven et al., 2013).

Games can be used for pure entertainment though it will always have a learning outcome of fun (Koster, 2013). “The term ‘gaming’ exists within a loosely demarcated field of interactive, participatory activities aimed at involving participants, who may be the actual stakeholders in an activity. Related terms include simulation games, gaming simulations, policy exercises, and serious gaming” (S. Meijer, 2015, p. 516). The simulation environment in the game can be used as a real-life reinterpretation to produce new insights on certain problems. In that sense, they are turned into simulated (safe) environments for human interaction on (multi-variable) complex (wicked) problems that demand creative (participative) solutions from multi-stakeholders (Duke & Geurts, 2004; McGonigal, 2011). Hence, they can also be designed and used for serious purposes. As opposed to having effects during the gameplay, the focus here is on the outcomes after the game session has ended.

For individuals, games can help to trigger actors to behave differently by influencing their attitudes, which results in different actions (Bogost, 2006; Bunchball, 2010; Deterding, Dixon, Khaled, & Nacke, 2011). Viewing the effects of their behavior might cause their attitude to change. One of the theories for exploring this influence of experience in attitudes and consequently in behavior changes is that of *experiential learning*. Accordingly, Fogg (2009) suggested that “for a person to perform a target behavior, he or she must (1) be sufficiently motivated, (2) have the ability to perform the behavior,

and (3) be triggered to perform the behavior” (p. 1). Besides, cognitive, affective, and psychomotor factors aim at creating attitude and behavioral change (Schrader & Lawless, 2004, p. 8). Schrader and Lawless (2004) found that knowledge instruction alone is a poor agent for influencing changes in behavior as “successful outcomes of interventions in education and performance improvement involve more than knowledge gains” (p.13).

The experiential learning approach suggests the relationship between interactive games and attitude to be a cycle in which attitudes result in behavior, which in turn changes attitudes. Attitudes are learned, and they correspond to the ways people respond to certain situations (De Freitas & Jarvis, 2009, p.216). Games can influence these reactions by getting the participants to learn from in-game experience (Kolb, 2000). Moreover, Antle et al. (2014) suggest that the use of games is highly dependent on context.

Behavior can be seen as the actual action performed by an agent in reaction to a stimulus or the environment. It is highly dependent on occasion, situation, and action, being easy to observe but difficult to measure (Janakiraman, Watson, & Watson, 2018). Attitude is an important factor of influence though it can influence multiple behaviors (De Freitas & Jarvis, 2009). Attitude can be defined as “the psychological evaluations a person has about an object, person or event” (Janakiraman et al., 2018, p.178). It expresses the individual’s disposition to react to an object, person, or event. Attitudes can be inferred from measurable responses as they are inaccessible through direct observation (Ajzen, 1989, p. 241).

The presented concepts are used to organize the protocol directed at filling the gap in literature discussing the effects of interventions on attitudes and, specifically, on how games can change them. As has been stated, despite behavior having an influence, it is assumed to be consequently affected by the attitude change.

In the next section, we present the protocol for conducting our literature review. It aims at identifying factors that can influence the players’ attitudes through games. More specifically, the results of the review process are directed at the effects of games on changing civil servants’ behavior.

3. METHODOLOGY

According to Kitchenham et al. (2009) a SLR “is a methodologically rigorous review of research results” (p.8). It differs from critical expert review in the sense that it aggregates existing evidence for the research question and can result in evidence-based guidelines (Bakir & Gunduz, 2019; De Vries, Bekkers, & Tummers, 2016; Frisch Aviram et al., 2019). Levy and Ellis (2006) argued that “an effective literature review should include the following characteristics: a) methodologically analyze and synthesize quality literature, b) provide a firm foundation to a research topic, c) provide a firm foundation to the selection of the research approach, and d) demonstrate that the proposed research contributes something new to the overall body of knowledge or advances the research field’s knowledge-base” (p.182).

As mentioned, the following questions guided the SLR:

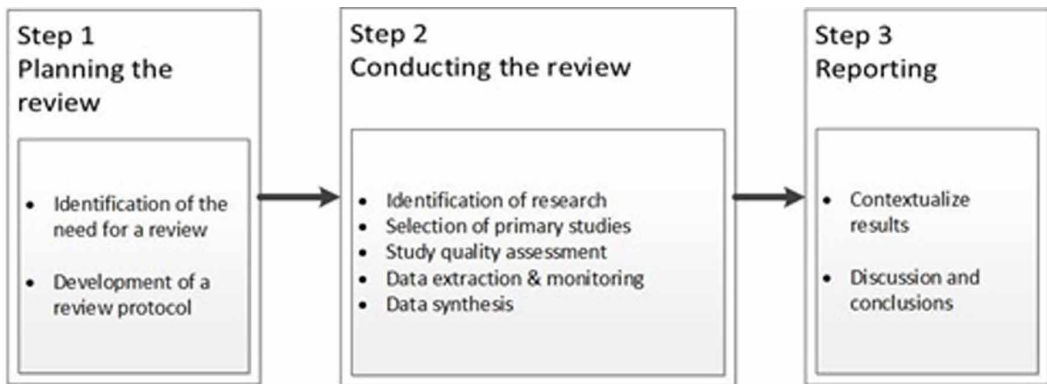
1. What are the factors that can lead to attitude change through games?
2. Which factors influencing attitude change through games can foster civil servants’ attitude change?

The steps proposed by Kitchenham (2004) - Figure 1 are used in the upcoming section.

3.1 Setting The Review Protocol

In the first step, *planning*, the goal is set in order to guide the review process: define the gaps in the literature for the successful use of games to change the attitude of civil servants. There has been

Figure 1. [Steps for SLR]. (Adapted from Kitchenham, 2004 p. 3).



much discussion of factors that influence the behavior of people through games, but no SLR has been conducted. The review protocol was defined as follows:

1. Identification of research: refine keywords to have a suitable selection of documents to be analyzed;
2. Selection of primary studies: refine formats and language so the papers can be compared and summarized (format scan);
3. Study quality assessment: refine content in order to have papers with similar objects (content scan) and refine domains to set the final group of papers (domain scan).
4. Data extraction and synthesis.

The five elements for a searchable question defined by the PICOC criteria (Petticrew & Roberts, 2008) were used to define the keywords: our *population* is civil servants; the aimed *intervention* is games; the *comparison* is to other interventions (text, videos, etc.); the *outcome* is to define factors that can influence attitudes for designing games, and the *context* is governments.

In the next section, the second step of the SLR was performed by *conducting* the search on the resulting terms, assessing the quality of the studies, extracting the available data, and analyzing it. The final step for the SLR, *reporting*, is presented in the final sections of this paper, together with our discussion and conclusions.

3.2 Performing The SLR

The SLR started with us searching for “serious game”, “attitude change” and “civil servant” in JSTOR, Web of Science (WOS), and Google Scholar. However, this search did not yield any results. Nevertheless, a general internet scan, including all keywords, resulted in hundreds of references. This suggests that there is much practical experience related to our topic. In addition, it shows that gaming for attitude change has not been translated into scientific research yet, which might be a consequence of the novelty of such use for this type of intervention.

As discussions of “attitude change” in civil servants within the academic sphere were the specific goal of our review, we excluded “civil servants” as a keyword, and we ran the protocol for factors that influence “attitude change” through games in general.

We modified the expression to “gam*” and “attitude*” and performed the search on different outlets, which resulted in a large number of references¹: JSTOR (54 thousand), WOS (1.3 thousand), and Google Scholar, which resulted in more than 1.5 million papers. The expression “gam*” and “government” also resulted in more than 100 thousand references, a volume that would be impossible

Table 1. Documents online on games and attitude change

<i>Keyword iterations</i>	<i>Jstor</i>	<i>WOS</i>	<i>GScholar</i>	<i>Repeat</i>	<i>Total</i>
“ <i>Serious game</i> ” + “ <i>attitude change</i> ” + “ <i>civil servant</i> ”	0	0	0	0	0
“ <i>Policy gaming</i> ” + “ <i>attitude change</i> ”	0	0	3	1	2
“ <i>Factors influencing attitude change</i> ” + “ <i>game</i> ”	0	0	9	0	9
“ <i>Factors affecting attitude change</i> ” + “ <i>game</i> ”	0	0	13	0	13
“ <i>Serious gaming</i> ” + “ <i>Attitude Change</i> ”	0	1	152	15	138
“ <i>Serious game</i> ” + “ <i>Attitude Change</i> ”	0	4	424	107	321
					483

to analyze. If the keyword “civil servant” was included, the number of resulting references was still large as many publications included the terms for other public policy analysis that was outside our scope, such as economic “game theory”.

The expression “serious game” helped us to shorten the list and focus our analysis. Another iteration included “attitude” in the filters (41 thousand in Google Scholar). Following De Vries et al. (2016), we introduced “change” to our scan. This still yielded a large number of documents (10 thousand documents). As our focus was on reasons for attitude change and not on other aspects of the changes (i.e., whether change happens or the types of change), we used the expression “attitude change”. For the SLR protocol, the resulting outcome was assessable (one thousand publications) and allowed us to progress our search for factors influencing “attitude change” through games.

In Table 1 the keywords used together with the corresponding results from JSTOR, Web of Knowledge and Google Scholar are shown. The initial group of 483 resulting papers for all the scanned keyword combinations (“Policy gaming”, “attitude change”, “Factors influencing attitude change”, “game”, “Factors affecting attitude change” and “Serious gaming”) suggests academic interest on the topic. The rapidly rising trend seen over the last decade seems to have stabilized, as the last two years, there seems to have been a change in the slope. Still, the rising trend in research interest is shown by the number of publications, to be further discussed in Figure 2.

A general format scan was performed next within the 483 documents resulting from the defined keyword search. Only journal and conference papers were selected. Books were excluded, as they are often general overviews and should be mentioned by papers if they present valuable contributions. Furthermore, other document formats (such as reports and other media) were excluded, as they do not have the validity of published papers. Finally, we excluded papers that were not written in English due to the difficulty of translating and discussing the findings. The format scan revealed 359 papers that were suitable for content analysis - Table 2.

The content scan was then performed to identify whether these papers had the targeted focus of analysis: game and factors influencing attitude change. For games, we decided to search for the explicit mention of an artefact or a theoretical discussion related to games. Pure simulations, interactive media, social networking, and other means were excluded from our selection. On the criteria of factors influencing attitude change, papers that focused on other content in their analysis, such as game design, economic impact, or cultural studies, were excluded. The content scan resulted in 68 selected papers - Table 3.

The abstracts of the 68 papers were scanned for their focus. We aimed to find whether papers discussed attitude change or just mentioned it as a secondary subject. Additionally, the domain

Figure 2. Mapping the articles based on year of publication

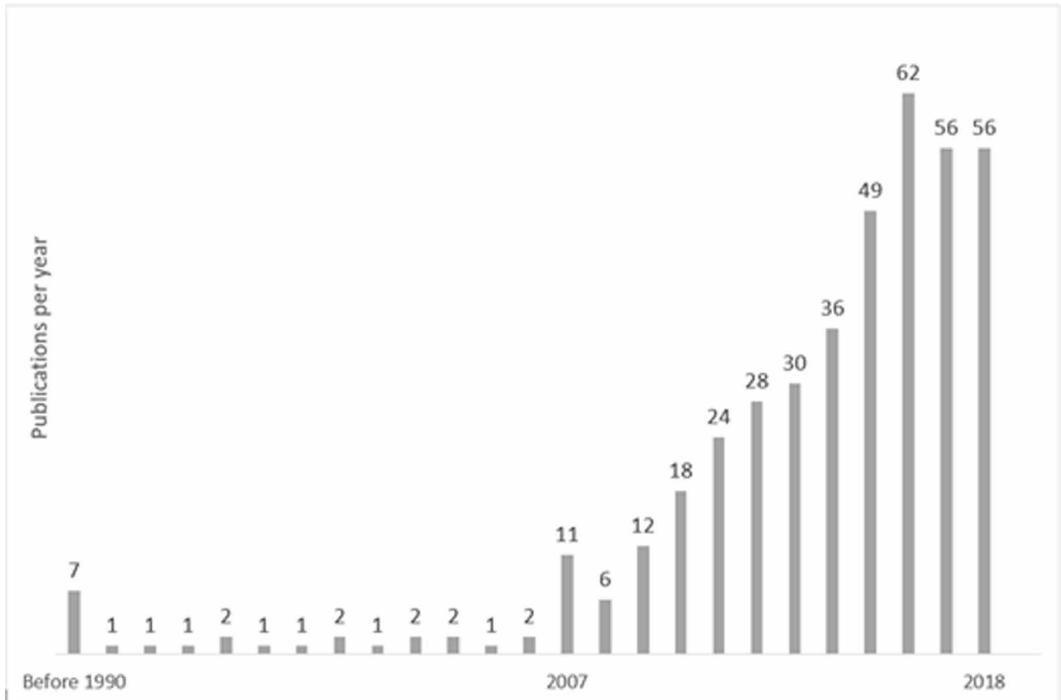


Table 2. Online papers in english for games and attitude change

	Not in English	Not book or paper	Books	Papers written in English
“Policy gaming” + “attitude change”	0	0	1	1
Factors influencing attitude change + “game”	0	2	1	6
“Factors affecting attitude change” + “game”	1	1	0	11
“Serious gaming” + “Attitude Change”	12	8	22	96
“Serious game” + “Attitude Change”	8	18	50	245
				359

Table 3. Online papers with a focus on attitude change and games

	Attitude change	Game	Both
“Policy gaming” + “attitude change”	0	0	0
Factors influencing attitude change + “game”	3	0	0
“Factors affecting attitude change” + “game”	8	0	0
“Serious gaming” + “Attitude Change”	47	69	38
“Serious game” + “Attitude Change”	87	122	30
			68

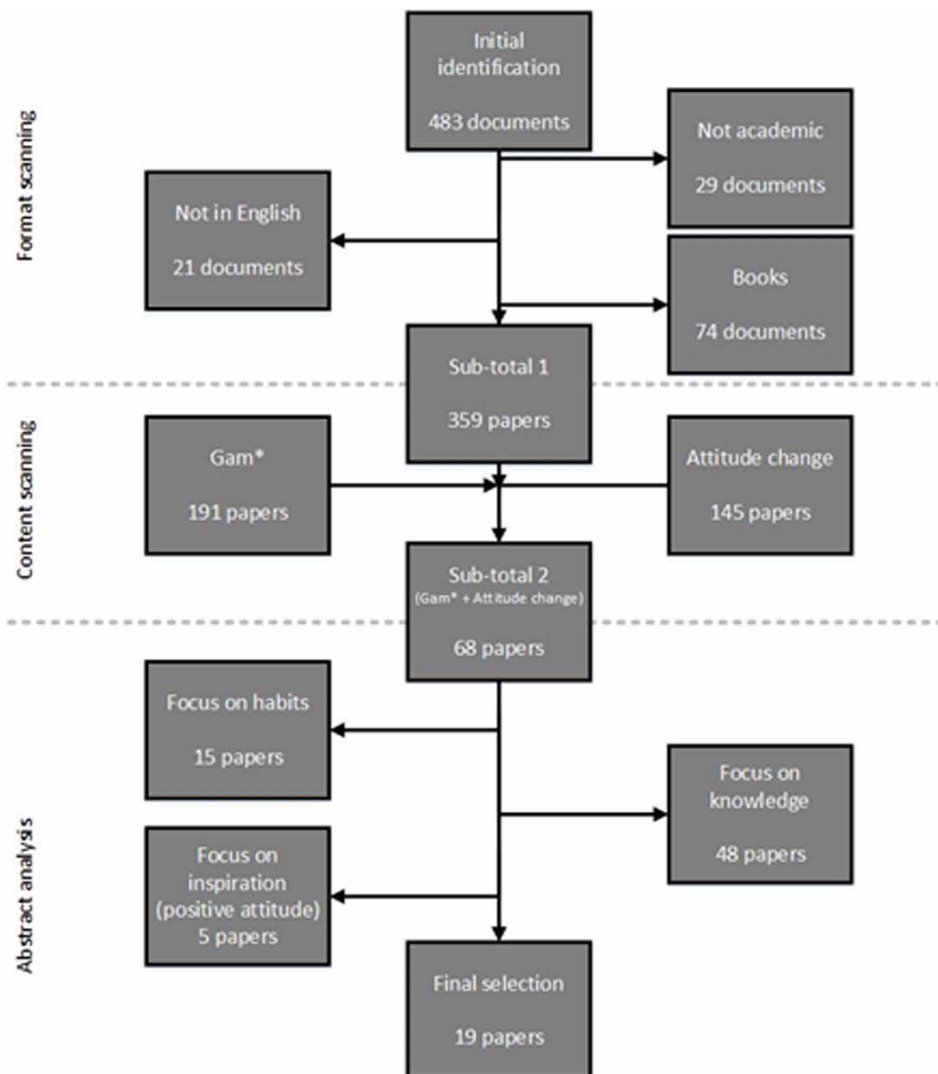
under study and the research methods utilized were observed, as this was an informative scan on the selected papers.

Of the 68 papers, only 19 contributed directly to the discussion of attitude change - Figure 3. The selection of 19 papers resulting from the SLR protocol was extracted and analyzed. The first findings from the scanning of the 19 papers are presented in the next subsection and the upcoming section explores the contributions to the discussion of factors influencing attitude change through games.

4. FINDINGS

In total, 19 papers selected using our SLR protocol were analyzed in detail. Although none are focused on civil servants, they provide relevant insights. They aggregate important elements for the attitude change discussion context even while not being directly related to it. It might be worth highlighting

Figure 3. Paper selection process summary



that the 19 papers analyzed 81 games, which indicates the relevance of this kind of intervention. However, it also indicates that there is an extensive experience where serious games are used for realizing attitude change, although there is no common attitude model connecting them.

4.1 Underlying Theories

The theoretical frameworks used to discuss games in the papers was another emerging topic. They are the basis for understanding and analyzing attitudes and designing interventions for attitude changes.

In total, 13 different theories were identified. The two most used references were Theory of Planned Behavior (TPB) (used in three papers) and Procedural Rhetoric (also used in three papers). TPB is considered an expansion of the Theory of Reasoned Action (TRA), which suggests Behavior Intention as one of the most accurate predictors of actual behavior (Ajzen, 1991). Procedural Rhetoric, as formulated by Bogost (2007), focuses on the analysis of rules and dynamics (components of play) as influencers for attitude change through persuasion. The reference for the papers on the theories used are listed in Table 4.

The theories are different in nature and consider different aspects of attitude change. This shows the diversity of the field, as there is no single dominating theory. Moreover, this diversity will hinder the integration of the theories into a uniform one. Which theory is most suitable seems to depend on the problem at hand and on the context.

Table 4. Mapping the articles based on theories used

Theory	N	Description	Reference
1. Theory of Planned Behavior / Theory of Reasoned Action	3	Expansion of the Theory of Reasoned Action, suggests that Behavior Intention is one of the most accurate predictors of actual behavior and it is influenced by Perceived Behavioral Control.	(Blythe & Coventry, 2012) (Knol & De Vries, 2010) (Williams, Nurse, & Creese, 2019)
2. Procedural Rhetoric	3	Focuses on rules and dynamics (play) as great influencers for behavior change through persuasion	(Antle et al., 2014) (Chow, Susilo, Phillips, Baek, & Vlahu-Gjorgievska, 2017) (Ruggiero, 2014)
3. Game-based learning	2	Discusses the learning outcomes of playing games	(Janakiraman et al., 2018) (Yang, Lin, & Liu, 2017)
4. Protection motivation theory	2	Explores factors that lead people to protect themselves when triggered by fear	(Blythe & Coventry, 2012) (Williams et al., 2019)
5. Attribution Theory	1	Focuses on understanding the explanation people develop to describe a certain behavior	(Richey Smith, Ryder, Bilodeau, & Schultz, 2016)
6. Bystander Intervention Model	1	Focuses on the analysis of what triggers an observer to be active or passive in certain conflictive situations	(A. DeSmet et al., 2018)
7. Contact theory	1	Under certain conditions, contacts affect inter-group resistance and result in inter-group perceptions to out-group	(Nilsen, LeDonne, Klemperer, & Olund, 2011)
8. Emergent Dialogue	1	Focuses on creating authentic participation through intrinsic motivation by getting participants to express/communicate with multiple bidirectional outcomes	(Antle et al., 2014)
9. Experiential learning	1	Assumes that knowledge is built through practical experience that by reflection changes perceptions	(De Freitas & Jarvis, 2009)
10. Information Deficit model	1	Assumes that people change their perceptions by assessing more information	(Antle et al., 2014)
11. Instructional design theory	1	The use of media artefacts designed specifically for certain purposes can change audience' perceptions	(Janakiraman et al., 2018)
12. Self-Determination Theory	1	Focuses on exploring the different motivations that lead people to perform a certain behavior (intrinsic and/or extrinsic)	(A. DeSmet et al., 2018)
13. Social Cognitive Theory	1	Focuses on the influence of social factors and media on people's behavior	(A. DeSmet et al., 2018)

The scanning also shows that, depending on the theory used, different focuses are considered in the attitude change discussion. An example of this is the difference between defining factors that can influence attitude through gameplay and looking for game features that have an impact on the gameplay itself. The variety of theories found indicates another dispersion in the field on frameworks for analysis.

Given the bureaucratic and constrained environment of governments, theories connecting individual experience with the processes of change seem adequate for discussing civil servants' attitudes. Experiential learning and Theory of reasoned action are two examples of such theories that could easily be used in this case.

In the following section, we present the game features found in our scanning. The factors of influence on attitude change have their own section as they form the main discussion of this paper.

4.2 Game Features For Attitude Change

Another attempt at integrating the discussions was made by focusing on game features. Game features are the characteristics of games, and they tend to have an impact on the gameplay itself. For some studies, the analysis of game features was used as the counterpart for the variables influenced by the game. To enable a comprehensive discussion, features similar to one another were aggregated into groups.

“Realism” is the most used category when considering game features on analysis (9). “Feedback, rewards and outcomes” comes second (6). Interactivity is used in 5 papers as well as “Persuasive message, Meaningful Mode of communication or Beliefs” (considered here as a group). “Personalization” also appears in 5 studies. The list of features that are mentioned by at least two papers is shown in Table 5.

In addition to this, another long list emerged from the scanning process. Negotiation, Multiplayer, Accessibility, Dialogue, “High or low exposure to the game/video”, Intuitiveness, Multimodality, Use of Non-player characters (NPC), Praise (images, symbols, sounds, words for feedback), Roleplaying, Strategic Level of Decision-Making, Suggestion (hints) and Time-Limitations are some of them. They reinforce the challenges for converging semantics within the 19 papers resulting from our SLR.

As defined in the introduction, *attitude* expresses the individual's disposition to react to an object, person or event, and can be inferred from measurable responses. In our scanning, *Attitude* variables are factors that are observed and discussed in the papers as resulting from gameplay. They are the units or references used to discuss game effects on players or their attitude. *Game features*, on the other hand, are the aspects considered when looking for characteristics of the game itself from a design or gameplay perspective. They aim at creating the experiences and feelings resulting from the game, instead of having an effect on the participants' behaviors – which is the focus of this SLR and will be presented in the next section. Given that game features were not the main focus of this study, the full list was not included in the paper.

4.3 Attitude Change

The initial analysis that was started in the previous section presented common elements used by the 19 English-language academic papers to explore different dimensions of games. In this section, the main findings are presented, specifically for the game factors influencing change in attitudes.

As in the previous section, a diverse list in terms of game factors also emerged from the SLR - Table 6. In total, 30 factors were found. “Attitude” emerged in 8 papers, mostly defined as an observable behavior or an evaluative affect about performing a behavior (Ajzen, 1991; Venkatesh, Morris, Davis, & Davis, 2003). The experiential learning cycle connects attitude and behavior, turning one into a variable of the other, depending on the approach. Consequently, “Behavior” appeared as a used concept for another group of papers and is mentioned in second place (7).

In different analyses, behavior and attitude are used as part of the same learning cycle. Some might take attitude as the leading factor and use it as an influence to define behavior; others use

Table 5. Game features

Game feature	N	Reference
1. Realism	8	(Chow et al., 2017) (De Freitas & Jarvis, 2009) (DeSmet, Shegog, Van Ryckeghem, Crombez, & De Bourdeaudhuij, 2015) (Flood, Cradock-Henry, Blackett, & Edwards, 2018) (Janakiraman et al., 2018) (Nilsen et al., 2011) (Ruggiero, 2014) (Williams et al., 2019)
2. Feedback, Rewards and Outcomes	6	(Antle et al., 2014) (Chow et al., 2017) (DeSmet et al., 2015) (Janakiraman et al., 2018) (Williams et al., 2019) (Nilsen et al., 2011)
3. Interactivity	5	(Chow et al., 2017) (DeSmet et al., 2015) (Fijnheer, van Oostendorp, & Veltkamp, 2018) (Steinemann, Mekler, & Opwis, 2016) (Williams et al., 2019)
4. Persuasive Message / Meaningful Mode of Communication / Beliefs	5	(Antle et al., 2014), (De Freitas & Jarvis, 2009), (Flood et al., 2018), (Ruggiero, 2014), (Steinemann et al., 2016)
5. Personalization	5	(Chow et al., 2017) (DeSmet et al., 2015) (Fijnheer et al., 2018) (Kolek, Šisler, & Brom, 2018) (Williams et al., 2019)
6. Narrative / Content	5	(Antle et al., 2014), (DeSmet et al., 2015), (Williams et al., 2019), (Jacobs, 2018), (Steinemann et al., 2016)
7. Goals / Challenges / Competition and Cooperation	4	(Antle et al., 2014), (Chow et al., 2017), (DeSmet et al., 2015), (Williams et al., 2019)
8. Mood / Enjoyment / Excitement / Entertainment	4	(Chow et al., 2017), (DeSmet et al., 2015), (Jacobs, 2018), (Steinemann et al., 2016)
9. Flow / Planned Redundancies	3	(Chow et al., 2017), (DeSmet et al., 2015), (Janakiraman et al., 2018), (Ruggiero, 2014)
10. Active Engagement	2	(Janakiraman et al., 2018) (Ruggiero, 2014)
11. Facilitation	2	(De Freitas & Jarvis, 2009) (Flood et al., 2018)
12. Visualizations	2	(Janakiraman et al., 2018), (Jacobs, 2018)
13. Involving target group in design	2	(De Freitas & Jarvis, 2009) (DeSmet et al., 2015)
14. Autonomy / Limitations on the player's agency	2	(Flood et al., 2018), (Kolek et al., 2018)

behavior, particularly past behavior, as a factor for updating attitudes. As both appear in the analysis, they are included as different variables. As previously discussed, behavior is the actual action of an agent which is dependent on occasion, situation, and action (Janakiraman et al., 2018); while, attitude is a factor of influence for behavior (De Freitas & Jarvis, 2009) which can be measured through responses (Ajzen, 1989, p. 241).

Concepts related to “Self-efficacy” (Bandura, 1977) (such as “Locus of control” from Yang et al. (2017) or “Perceived behavioral control” from Ajzen (1991)) are mentioned in another 7 studies. “Cognitive” or “Knowledge” variables are defined for 6 studies. Another 6 papers use “Affective” variables as their main reference (such as “Bystander behavior” (Ann DeSmet et al., 2018) or “Coping approaches”, “Vulnerability Perception” or “Appreciation”). “Response cost”, “Efficacy” or “Benefits” form a group of variables mentioned in 5 other papers. Table 6 shows the complete lists of factors.

The 30 factors are diverse, heterogeneous, and relate to different aspects and levels. As can be seen, the dispersion of references is confirmed once more, compounding the challenges for building up knowledge on influence factors for attitude change. The comparison between analyses is impaired:

Table 6. Factors for attitude change

Factors	N	Description	References
1. Attitude	8	Evaluative affect about performing a behavior	(Blythe & Coventry, 2012) (De Freitas & Jarvis, 2009) (DeSmet et al., 2015) (Fijnheer et al., 2018) (Kolek et al., 2018) (Nilsen et al., 2011) (Soekarjo & van Oostendorp, 2015) (Steinemann et al., 2016)
2. Behavior	7	Actions of person in real life	(De Freitas & Jarvis, 2009) (DeSmet et al., 2015) (A. DeSmet et al., 2018) (Fijnheer et al., 2018) (Janakiraman et al., 2018) (Knol & De Vries, 2010) (Williams et al., 2019) (Yang et al., 2017)
3. Cognitive or Knowledge	6	Objective information of an object or event	(De Freitas & Jarvis, 2009) (DeSmet et al., 2015) (Fijnheer et al., 2018) (Flood et al., 2018) (Janakiraman et al., 2018) (Yang et al., 2017)
4. Subjective Norm	4	Someone's perception of how people who matter think about performing a behavior	(Blythe & Coventry, 2012) (DeSmet et al., 2015) (A. DeSmet et al., 2018) (Knol & De Vries, 2010)
5. Affective	3	Emotions and feelings towards a certain object	(De Freitas & Jarvis, 2009) (Janakiraman et al., 2018) (Steinemann et al., 2016)
6. Self-Efficacy	3	Belief that the individual contribution will influence the success or failure of a situation	(Blythe & Coventry, 2012) (DeSmet et al., 2015) (A. DeSmet et al., 2018)
7. Response Cost	3	Negative punishment (removal)	(Blythe & Coventry, 2012) (Williams et al., 2019)
8. Psychological Ownership	2	Self-perception of freedom to act	(Blythe & Coventry, 2012) (Flood et al., 2018)
9. Locus of Control	2	Self-perception of individual contribution to an event (success or failure)	(Blythe & Coventry, 2012) (Yang et al., 2017)
10. Engagement	2	Participation in certain action	(A. DeSmet et al., 2018) (Fijnheer et al., 2018)
11. Perceived Severity / Vulnerability	2	Strength perception of specific condition	(Blythe & Coventry, 2012) (Williams et al., 2019)
12. Outcome of the game	2	Feedback	(Blythe & Coventry, 2012) (Steinemann et al., 2016)
13. Appreciation	1	Positive emotion received from others	(Jacobs, 2018)
14. Benefits	1	Positive outcome	(Williams et al., 2019)
15. Bystander Behavior	1	Observer actions towards the observed scene	(A. DeSmet et al., 2018)
16. Choice for Donation	1	Option to give resources	(Steinemann et al., 2016)
17. Coping Approaches	1	Action to solve problems	(Steinemann et al., 2016; Williams et al., 2019)
18. Denial	1	Refusal to accept or act in a certain situation	(Jacobs, 2018)
19. Enjoyment	1	Pleasure	(Steinemann et al., 2016)

continued on following page

Table 6. Continued

Factors	N	Description	References
20. Fidelity	1	Acting in an expected way	(Antle et al., 2014)
21. Outcome Expectations	1	The belief in receiving or seeing something in return for a certain action	(A. DeSmet et al., 2018)
22. Perceived Behavioral Control	1	Perception of the facility to perform a behavior	(Knol & De Vries, 2010)
23. Perceived Environmental Constraints	1	Perception of limits imposed by environment	(DeSmet et al., 2015)
24. Perception of “actors” and “actions”	1	Perception of other stakeholders and their capacities	(Nilsen et al., 2011)
25. Relational	1	Perception of the influences of others	(A. DeSmet et al., 2018)
26. Response Efficacy	1	Perception of capacity to act	(Kolek et al., 2018)
27. Suspense	1	Effect of unpredicted outcomes	(Steinemann et al., 2016)
28. Time of Gameplay	1	Duration of gameplay	(Flood et al., 2018)
29. Workload	1	Amount of tasks	(Jacobs, 2018)
30. Group Membership	1	Identity within group	(Ruggiero, 2014)

as, ‘attitude’ is the keyword for our search, but was not central in half of the studies. The similar use of concepts for building up common ground and dialogue within studies is needed. The review showed there is no common vocabulary for games. Integrating discussions and converging concepts can strengthen the discourse in this research field. Moreover, this effort can result in relating some factors to specific audiences.

5. DISCUSSION

Our review showed that gaming is used more and more for influencing the attitude of civil servants. While gaming is often used in practice, the SLR shows that specific literature about the attitude of servants remains scarce. Although fragmented, in other fields, there is a variety of literature available that can be used as a body of knowledge.

Our first research questions targeted those factors that can lead to attitude change through games. The second research question aimed to derive factors influencing attitude change through games, specifically for civil servants. The second question aims at a specific audience, but still with the same purpose of understanding the mechanisms that a game can trigger in its players and which result in attitude changes.

Our protocol resulted in the analysis of 19 academic papers written in English. Based on this analysis, we conclude that within the 19 papers found, only the first question can be fully explored since none of the papers presented attitude change discussion for civil servants. This result indicates that there is a gap in the literature that needs to be filled. The SLR also demonstrates a lack of literature exploring potential uses by civil servants of games related to attitude. As this can be explored, we recommend further research.

On the other hand, it is clear that the general findings from the first research question can still be translated to civil servants. As the 19 papers present content applied to different audiences, it is feasible for the general conclusions of this content to be transposed to the use of games in governments and government personnel.

The existing gap relating to factors for better design of games for changing attitude (Antle et al., 2014; Blythe & Coventry, 2012; Boyle et al., 2016; Connolly et al., 2012; Kolek et al., 2018) could not be extensively covered with our findings. The theories used by the referred analysis were diverse. No single dominating theory was found as the diversity hinders the integration into a uniform theory.

The most suitable theories will depend on the stated problem and its context. This supports once more the idea of making context-specific games, as suggested by Antle et al. (2014): “The particulars of each game design context will dictate how [a game] can be implemented” (p.182). Our SLR reinforces the need for further research to deepen these relationships between games and their context. Furthermore, it emphasizes the need for searching for patterns that might go beyond context-dependent designs.

Games were also found to trigger players to act differently, as many of the studies confirmed an effect on players (Bogost, 2006; Bunchball, 2010; Deterding et al., 2011). The in-game experience, as defined by Kolb (2000), seems very likely to produce effects, the more so with well-designed interventions.

The 10 papers with case studies focused on evaluating games. They ran experiments that indicate a trend for influencing participants’ attitudes change even though they could not converge on factors through which such influence occurs. One paper even targeted open data (Johnson, Puussaar, Manuel, & Wright, 2018), but it did not focus on games for governments nor on attitude change and was excluded from the final list of 19 papers. The efforts for converging semantics did not result in a single common list of game features. Even within the field of game analysis, conceptual dispersion emerged once more.

The insights from other sectors show that games are likely to be suitable for tackling bureaucrats’ tendency to develop defense mechanisms, as described by Lipsky (1971). Even if concrete limitations of resources and real threats cannot be faced through a game, it might be of effect on the other dimensions previously listed, such as reinterpreting reality, distorted by these defense mechanisms. Both the dependence on routines for security and unfamiliarity with new procedures for operating differently can be put to practice in the safe environment of a game. As we found, new experiences like this can be influential to attitudes in other contexts (Kolb, 2000) and might work for civil servants as well (Gould-Williams, 2004).

The challenge, that civil servants become shielded from awareness of the impact of their behavior, which leads them to resist change, seems to be influenced even more by new experiences. By simulating or role-playing actions of different stakeholders, it might be easier to assess perception and produce empathy of the participants in play (Jacobs, 2018; Ruggiero, 2014). Civil servants can be affected by the experiential learning of games. By addressing this key factor for resistance, the understanding to support practitioners towards successful changes is increased (Kuipers et al., 2014). We recommend further research on specific game features relevant for influencing civil servants and the types of problems that can be addressed through games.

The list of 30 attitude factors can also be used as a first step towards testing games specifically designed for attitude change in civil servants. Focusing the analysis of governmental interventions on some of the listed factors may result in converging theories onto common ground. The absence of other studies for this audience increases the need for references when performing such studies. Our list can serve as a starting point and should be shortened by further research focusing on the ones with real consequences for civil servants’ behavioral change.

Broadly speaking, four clusters of common characteristics of the factors could derive from the list: (1) factors related to evaluations made through gameplay (Response cost, Benefits or Outcomes expectations); (2) factors arising from perceptions derived from game experience (Subjective norm,

Coping approaches or Group membership); (3) factors related to types of results of the game (Cognitive, Affective or Enjoyment); and lastly, (4) factors built on the feelings from the game (Workload, Fidelity or Time of Gameplay). These clusters can add up to a structural starting point for further discussions, as show in Table 7.

As an example, factors on Cluster 2 such as Subjective Norm (Blythe & Coventry, 2012; Ann DeSmet et al., 2018; DeSmet et al., 2015), Group-membership (Ruggiero, 2014) and other social constraints seem to be highly important, considering the limitations of resources and real threats faced by civil servants. We can also expect Fidelity (Antle et al., 2014) and Time of Gameplay (Flood et al., 2018) from Cluster 4 to be key as the reinterpretation of reality is needed in the game to overcome defense mechanisms. The increase in expectations related to outcomes such as Benefits (Williams et al., 2019) and Response Efficacy (Kolek et al., 2018) from Cluster 1 can also support insecurity and unfamiliarity in respect of new procedures that can be introduced into the game. Once more, the new in-game experiences should be the focus for changing civil servants' attitudes.

As tackling civil servants' tendency to develop defense mechanisms is important, games seem to be an appropriate approach. They can put to practice new routines that tend to challenge security and new procedures for operating differently in a safe environment. Such new experience is influential to the attitudes of other audiences and might also be effective for civil servants in governments. Likewise, raising awareness of the impact of behaviors may also increase empathy and reduce resistance to change. Simulations or role-play of different stakeholders can alter the perception of the participants – civil servants in this case.

In conclusion, within the 19 papers, more than 13 distinct theories were used, and only 4 of the theories have been used in more than 2 papers. In a similar vein, a variety of 30 factors potentially influencing attitude changes was found. There are many approaches, and these are not related to each other. Most of the studies evaluating the effects of games use experiments and demonstrate that gaming can influence change in participants' attitudes. However, there are no analyses of which types (or factors) of interventions should result in which kind of attitude change. There does not seem to be a single best way for all situations, as each one of them is connected to specific domains of game interventions.

To our knowledge, the SLR method used in this paper has never been used in studies before for identifying factors that influence behavior change through game use. No outcomes on its use for civil servants were found. As games are increasingly being used by governments and civil servants are the professionals who implement public policies, finding this gap is important to set a future research agenda for academics and practitioners. Understanding how better interventions can be designed when targeting this audience can increase the effects and outcomes of interventions still to be developed.

Table 7. Clusters of factors

Evaluations made through gameplay	Perceptions derived from game experience	Types of results of the game	Feelings from the game
<ul style="list-style-type: none"> • Response cost • Benefits • Outcome expectation • Quality of life • Trust • Denial • Choice for Donation • Perceived Environmental Constraints 	<ul style="list-style-type: none"> • Subjective norms • Coping approaches • Group membership • Locus of control • Self-efficacy • Awareness and Empowerment • Bystander Behavior • Perceived Severity • Vulnerability 	<ul style="list-style-type: none"> • Cognitive • Knowledge • Affective • Enjoyment • Outcome of the game • Relational • Perception of "actors" and "actions" 	<ul style="list-style-type: none"> • Workload • Fidelity • Time of gameplay • Response efficacy • Suspense

6. CONCLUSION

Gaming for attitude change is an emerging field that has is becoming increasingly attractive. Although there are games for enabling attitude change in civil servants in government, our SLR revealed that they were not documented in the literature as searched in this paper. Games can have a variety of purposes.

We performed the first Systematic Literature Review on the topic of “attitude change” and “serious games”. Our literature survey shows that different approaches to game design can be used for changing attitudes. The list of referenced theories and defined variables found demonstrates a dispersion of approaches to discussing attitude change through games. The variety can be explained by the problem at hand, the goal of the game, and its context.

Our research indicates that these studies also do not converge in a certain theory or methodological approach. They are so diverse that they cannot be unified in a straightforward manner. The design of games for attitude change seems to be highly dependent on the context. Different contexts demand different types of games and should result in multiple influencing variables being observed.

No games specifically targeting civil servants in government were found in the literature review. However, there are many games in practice, used for many purposes, but they are not analyzed in scientific outlets or might not have enough theoretical grounding in gaming. Hence, we expect that the number of cases in the coming years, and we recommend more research in this field.

The findings of this paper can be a starting point for governments to design games that influence attitude change in civil servants. The four clusters of factors’ common characteristics found can help to progress in such a direction. Games may be expected to change the attitude of players in general as experiential learning can be more effective than other approaches for reaching this objective. Through the experiential learning cycle, attitudes can be influenced by experience that can result in different behaviors. Consequently, games can also be designed for civil servants and their attitude change. Change in employee attitude towards public policies could affect the quality of public services provided to the community. Games can be of use to achieve such a change. The provided list of factors and its initial clustering could be the starting point for designing these interventions.

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ENDNOTE

¹ The initial search and refinement was performed in 27/08/2019.

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