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Playing Mean: Does It Imply a Mean Player?

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Abstract

Games allow players significant freedom to express themselves and behave as they see fit. As a consequence, in some games more than others, we may encounter hostile behavior. We explored whether players behaving in this manner are simply expressing their personality traits in the game or, rather, adopting this playstyle regardless of them. We conducted a three-year study observing over 250 people playing the turn-based, player-versus-player strategy game Diplomacy. Subjects were asked to fill out a questionnaire to determine their score on the social dominance orientation (SDO) scale—with a return rate of approx. 54%—while their in-game playstyle was analyzed for manifestations of hostile behavior. We found no statistically significant correlation between hostile in-game behavior and participants' SDO score. However, we did find significant positive correlations between some aspects of this behavior and their success.

Keywords: social dominance orientation; personality trait; hostile behavior; diplomacy strategy game

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Introduction

Computer games and online worlds have become a common part of modern lives and millions of people engage in these activities every day, be it for entertainment or socialization; virtual environments enable new interactions between people and new kinds of behavior. Much has been said and written in recent years on this topic; most research seems to focus either on online addictions (Kuss & Lopez-Fernandez, 2016), or on whether violent computer games promote physical violence or aggression (Ferguson, 2015; Ferguson & Dyck 2012).

In terms of Ivory's typology (Ivory, 2013), these two threads of research treat games as stimulus and avocation respectively, i.e., some external influence that might impact players' behavior or well-being in the real, physical world. But another frequently discussed, yet so far somewhat less researched, issue is the behavior of players in-game, i.e., while playing and interacting with their environment and other players. Virtual environments allow players to act however they see fit (within the technical constraints of the game) and invent new characters for themselves.

This research paper primarily explores the connection between players' personality traits and how these are manifested while playing a game. Observation data from students playing the strategy game Diplomacy were combined with the results of a questionnaire which measured their social dominance orientation (SDO) score. SDO (a psychometric construct based on the Social Dominance Theory, see Pratto et al., 2006) measures individuals' approval of group-based social hierarchy, prejudice, and discrimination. Furthermore, it has been commonly found to be associated with hostility, aggressiveness towards out-groups, and authoritarianism

(Altemeyer, 2003), making it an excellent fit for our case of a competitive strategy game in which such behaviors are observable and potentially related to players' efforts to win.

Despite increasing public and academic interest in hostile and toxic behavior online and in games, SDO has been utilized in this context only very sparingly, with Fox and Tang (2014) and Tang et al. (2019) serving as some of the very few examples. This field of research is certainly very active with many other theories and models being employed or tested (Beres et al., 2021; Kordyaka et al., 2020). We believe this research can help fill the gap and contribute to the ongoing debates by exploring the research question and testing our hypothesis (**RQ1**): How is a player's in-game behavior related to their SDO score?, (**H1**): players' SDO scores will positively correlate with how hostile their in-game playstyle is. Our secondary question is (**RQ2**): How is a player's in-game behavior related to the outcome of their game?

While the topic of this paper is related to the supposed rise of so-called toxic behavior in online games (Kwak, 2014; Neto et al., 2017; Zsila et al., 2022), it must be understood that we do not consider that to be a playstyle or a game strategy in the same sense as we are trying to analyze here. Adopting a highly belligerent strategy in a game does not necessarily mean engaging in toxic behavior, although they can coexist. This research paper is concerned with the former (i.e., aggressive territorial expansion, lying to other players about one's intentions, etc.) and not with the latter (i.e., abusing or verbally insulting other players, etc.), and we do not treat them as equivalent.

Related Work

Linking Personality Traits and Player Behavior

Questions regarding the connection between real personality traits and player behavior in virtual worlds are not just of scholarly interest and they are frequently debated even within gaming communities and in the related media. It is especially relevant to online games that enable and tolerate anti-social in-game behavior such as "griefing" (intentionally disrupting other players and their enjoyment of a game, from which the griefer derives pleasure; Achterbosch et al., 2017) or scamming, which are forms of the above-mentioned toxic behavior online. Even players themselves have often wondered whether some of their favorite games are just full of evil maniacs and sociopaths (Dibbell, 2008; Rigney, 2014; Yin-Poole, 2016).

Fortunately, despite being rather under-researched, a number of empirical studies have been conducted in this field, usually framed as player modelling or player profiling (see Bakkes et al., 2012). The most common approach is tracking players' in-game choices and actions (either by directly observing them play or by mining their accessible profiles), while also collecting psychometric data, usually in the form of results from the Big Five Factor Model (Lim, 2020) questionnaires.

Role-playing titles have proven especially suitable since they often offer much freedom of choice while also providing some useful narrative context for the players. Such studies have been conducted using games such as World of Warcraft (McCreery et al., 2013; Worth & Book, 2014; Yee et al., 2011), Ghost 2 (Wang & Yu, 2017), Fallout: New Vegas (Canossa et al., 2015), and Neverwinter Nights (van Lankveld et al., 2011).

In World of Warcraft, agreeableness tends to be a very strong predictor of player behavior such as kindness and cooperativeness (for high scores) or aggression (for low scores). Curiously, it was one of the least observable traits in Neverwinter Nights, in which openness was found to be the most influential variable that was counterintuitively negatively associated with lower levels of expressed curiosity. Extroversion showed significant correlations in Fallout: New Vegas and in some World of Warcraft studies (Yee et al., 2011), but not others (McCreery et al., 2013). Neuroticism has proved to be consistently elusive and difficult to correlate with observed gaming behaviors.

Similarly, suggestive results can be seen in even more free-form or sandbox-like games, such as Minecraft (Canossa et al., 2013), Second Life (Yee at al. 2010), and Sims 2 (Griebel, 2006) and even in action-oriented games like Overwatch (Delhove & Greitemeyer, 2020; Hodges & Buckley, 2018) and Battlefield 3 (Tekofsky et al., 2013). For example, conscientiousness was found to be the strongest predictor of playstyle in Battlefield 3, but not significant in Overwatch.

While all of the papers cited above have reported correlations for at least some of the tracked metrics and personality traits of their subjects, their results are not consistent. Interestingly, differences can sometimes be observed even within the same game, or the same type of games, perhaps due to the differing methods of data

collection and analysis employed. Another influential factor might be whether players interact with other human player characters or just computer-controlled non-player characters, as suggested by Williams and Clippinger (2002).

What we are also lacking is a general causal theory offering any explanation or prediction as to why some traits or characteristics show up when playing certain types of game and why others do not, and under what conditions. This is, of course, to be expected, given the relative newness of this field and the dearth of studies conducted thus far, the lack of consensus notwithstanding. Therefore, it is the goal of our paper to contribute to this area of research by adding to the growing (and rather inconclusive and inconsistent) pile of studies correlating player personality traits with their in-game actions and behavior. We chose to study a competitive strategy game, which, to our knowledge, has not been done before and which should therefore provide fresh insights and a new perspective. Diplomacy has an established track record of being used in research, especially in the context of education and international relations (Bridge & Radford, 2014; Drmola & Kraus, 2022; Kruskopf et al., 2021).

Using the Social Dominance Orientation Scale

Because our research specifically targeted hostile behavior, we opted to abandon the Big Five Factor Model in favor of a more focused and leaner SDO. We believed this conceptual trait would be more useful for our specific goal of exploring hostile behavior, especially in the context of our chosen strategy game, in which players are required to defeat other players while also being allowed to make (and, crucially, also to break) alliances as they see fit in order to succeed.

SDO has been used in similar contexts, although not specifically for player modelling and profiling in video games. For example, Fox and Tang (2014) found SDO to predict sexist attitudes among video-game players. Altemeyer (2003) used SDO metrics during his Global Change Game (a large-scale board game) simulation with students, in which he describes high SDO-scoring players as "… power hungry, domineering, mean, Machiavellian, and amoral." This seems to be an excellent scale to correlate with players' behavior in a strategy game of military maneuvering and scheming.

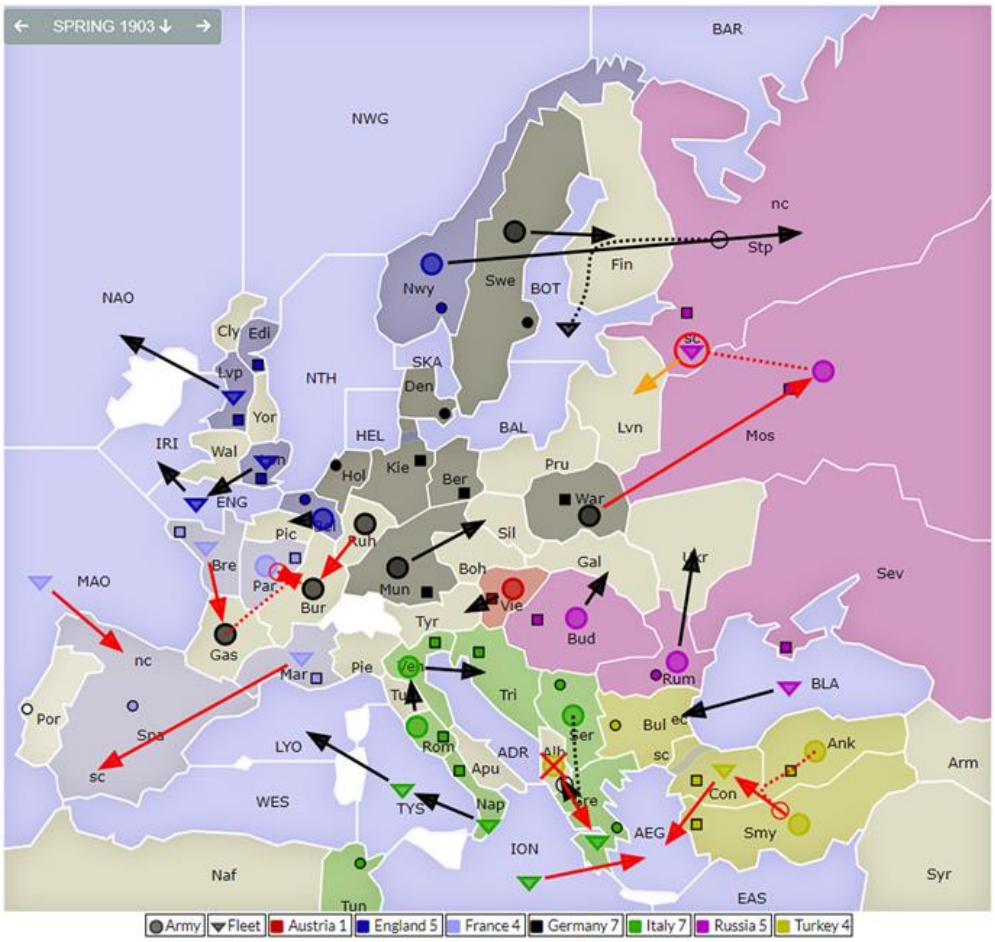
It should be noted that SDO is often considered to be closely linked to another, and possibly more widely known, personality trait—right-wing authoritarianism (RWA). While they are sometimes found to be correlated and share many traits (such as strong prejudice towards outgroups), they are not the same. Both types support hierarchical structures and social domination, but for different reasons. RWAs mostly consider other groups to be a threat and seek strong authority to establish or maintain desired social order. SDOs support social dominance not out of some innate reverence to the authority but because they want to be the authority. In the simplest terms, SDOs are wannabee dictators whereas RWAs are their willing followers and supporters (Altemeyer, 1998; Duckitt & Sibley, 2007). Therefore, in order to see if dictator-like behavior in a game correlates with a player's real personality traits, one ought to use SDO.

Methods

The Game

The game chosen for this study was Backstabbr (https://www.backstabbr.com/), which is a freely available web-based version of the classic board game Diplomacy developed by Tile Games (not for the purpose of this research). Each game involves seven players taking control of the major powers in early 20th-century Europe (see Figure 1 for a map of the game). The players then use their land armies and navies to expand their territory and capture "supply centers"—specific provinces, control of which enables them to recruit and maintain even more armies or navies. The goal is for them or their alliance to take control of the majority of the map (at least 18 of the 34 supply centers), which naturally drives them into competition and conflict over territory. Conversely, loss of all of their supply centers leads to players' permanent elimination from the game (Figure 2).

Figure 1. *An Example of the Map Interface, Which Players Use to Play the Game and Control Their Units.*

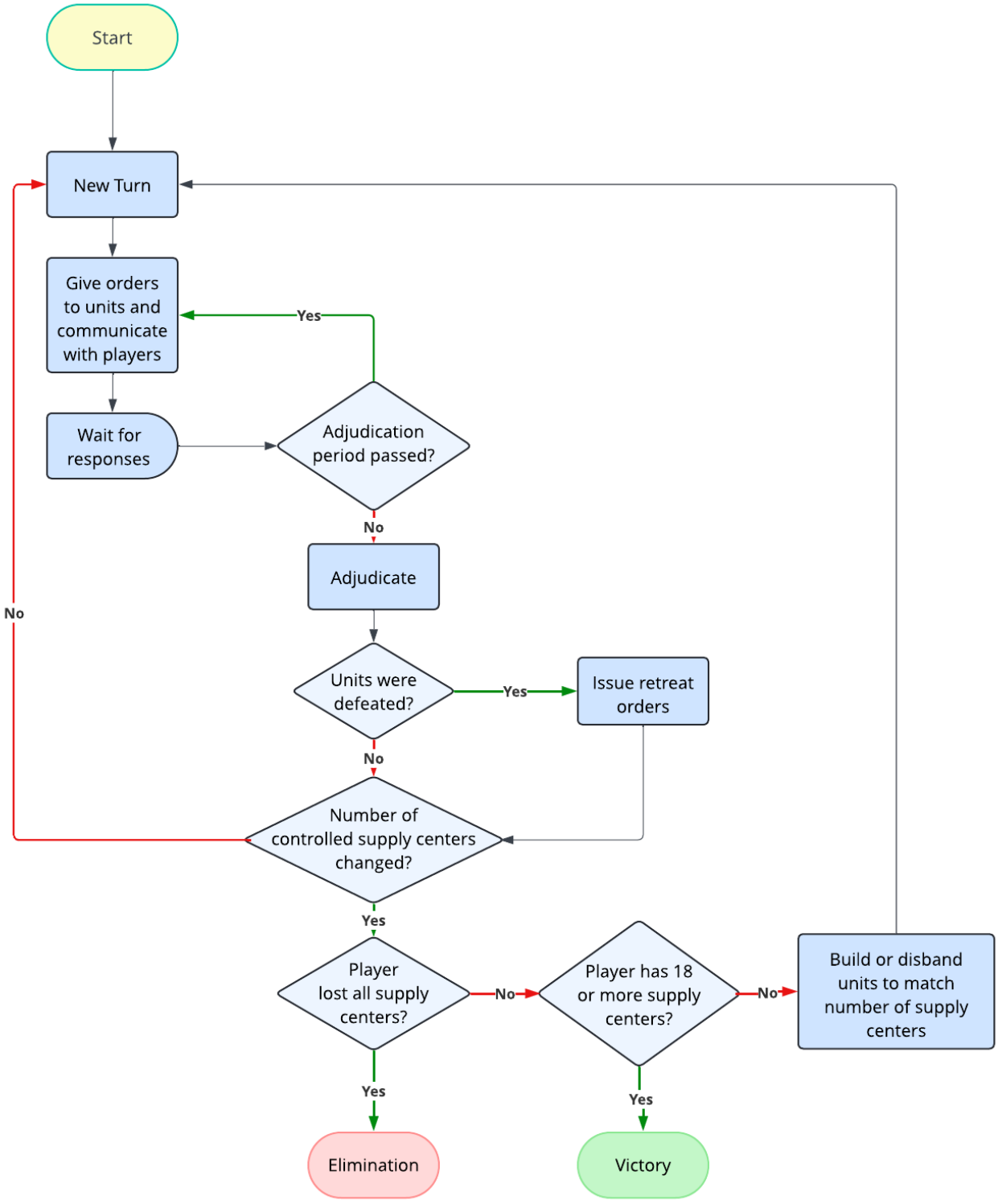


The combat itself is very simple, turn-based, and purely deterministic, thus largely eliminating both previous gaming experience and chance from influencing the outcome. Units can either hold their position, move by one province, attack, or support the action of another unit. Each province can contain only one unit at a given time and all moves are adjudicated simultaneously (i.e., the turns are concurrent).[1]

The game allows players to freely communicate among themselves using the in-game messaging system. This allows them to build relations, share information, negotiate, make deals, and coordinate their moves. Crucially, there is no rule or mechanism to enforce their agreements or prevent the players from breaking them. Therefore, they are free to scheme, lie, manipulate, or betray anything and anyone at will. The game then, as its name suggests, allows players to engage in this interesting behavior and us to observe them. This type of behavior would be exceedingly difficult or even impossible for researchers to systematically observe in the aforementioned games (such as single-player sandbox games, or team-based action shooters). We believe this type of game, together with the SDO scale, is an exceptional match for research of hostile behavior in a gaming environment.

This choice, however, comes with a significant downside. Unlike most of the player-modeling research papers mentioned above, we are unable to use automatic collection and tracking for all of our behavioral data. Interpreting negotiations and betrayals is too nuanced, and so is evaluating how domineering or manipulative one player is towards the others. Therefore, we had to rely on some manual and qualitative labor when analyzing the primary data, which will be further expounded in the sections below.

Figure 2. *Simplified Flowchart of the Game.*



The Sample and Settings

The study took place over a period of three years (2018–2020) among undergraduate university students enrolled in a course on military strategic thought, which is part of a wider civilian security studies program. This sample was therefore expected to be quite motivated and engaged, even more so due to the fact that their performance (meaning their effort, not necessarily the outcome) in the game counted, albeit to a small degree, towards their overall grade for the course. The sample was 62% male, aged 21–25, and none of the students reported previous experience with this particular game, making participation in this study their first encounter with the game, thus ensuring a level playing field.

At the start of each of the three semesters all the students were briefed about the game and its rules and subsequently randomly and anonymously divided into groups of seven players each. Therefore, students did not know who the other competing players in the game were, although they were able to share their identity with the others if they so wished. The anonymous setting could have allowed them to break some social conventions and inhibitions they might have otherwise felt themselves limited by regarding aggression, lying, betrayal, etc. Therefore, the study took place in what we consider a more natural and realistic (and, of course, less controlled) setting for gaming, unlike a laboratory-based experiment.

The games ran at a pace of one turn per workday, allowing students plenty of time to plan, strategize and communicate, until someone won, or the semester ended. Most of the games took around nine weeks to complete, so the pace was quite slow and measured. This also means any immediate events or current states of mind probably did not influence players in significant way. What other effects this relatively slow pace might have had on the players and their observed behavior remains unknown and hard to speculate about because relevant research which would allow such comparisons is currently lacking.

After the conclusion of the course, the students were sent an anonymized questionnaire asking for their feedback on the game, suggestions, criticism, and informed consent; it also, crucially, included the SDO scale (translated to the local language; see Loučný, 2015) as presented previously. Naturally, not all the students who initially enrolled in the course actively participated in the game, and of those who did, not everyone chose to fill out the questionnaire when asked to. Nevertheless, the survey return rate was quite good, with 258 players observed (of which 160 were men) and 140 questionnaires filled out over the three annual runs (the return rate was approx. 54%).[2] The non-returned surveys' variables were treated as missing values. Hence, all our analyses and results concerned with these self-reported data are based on a subsample of 140 players (60 women and 80 men). The gender re-partition thus stayed the same and the descriptives for the variables of interest between the whole set and the subset of returned surveys were very proximate.

Measuring the Social Dominance Orientation

Firstly, it needs to be noted here, that throughout the paper we use the term "personality trait" (or just "trait") for the relatively stable aspects of one's personality, which we consider to be an internal property of a person. In contrast, by "behavior" we mean observable actions of a person (or in our case, a player), which might be, to a varying extent, influenced by their personality traits, context, and environment.

Specifically, the shortened version of the SDO_7 psychometric scale is used here, as presented and validated by Ho et al. (2015). It splits the overall SDO trait into two subdimensions: dominance and anti-egalitarianism. Participants in the study expressed their agreement or disagreement with the following statements on a seven-point bipolar scale, from Strongly oppose to Strongly favor with Neutral in the middle:

Pro-trait dominance:

1. An ideal society requires some groups to be on top and others to be on the bottom.
2. Some groups of people are simply inferior to other groups.

Con-trait dominance:

3. No one group should dominate in society.
4. Groups at the bottom are just as deserving as groups at the top.

Pro-trait antiegalitarianism:

5. Group equality should not be our primary goal.
6. It is unjust to try to make groups equal.

Con-trait antiegalitarianism:

7. We should do what we can to equalize conditions for different groups.
8. We should work to give all groups an equal chance to succeed.

The final SDO score is computed by reverse-scoring the con-trait items and then averaging the scores for both subdimensions. Highly socially dominant individuals are then expected to score towards the top of the overall 1–7 scale. Based on the previously reviewed research, we are in effect testing H1: the players' SDO scores will positively correlate with how hostile their in-game playstyle is. The research design follows a mixed-methods and

longitudinal approach as the data collection lasted three years (see The Sample and the Setting on research procedure).

Measuring the Player In-Game Behavior

The next step was the most laborious one, as was hinted at earlier in the paper. While the SDO scoring was rather straightforward and automatic, we had to analyze the games themselves and our participants' behavior. We opted for an interpretative approach and formed panels of independent analysts, who went through all 38 games. These analysts (nine in total and all recruited from among senior students already familiar with the game) then used recorded logs of in-game moves (see Figure 1) and anonymized communication to carefully evaluate every individual player on the four scales we operationalized to capture the behavior we were interested in.

As no such applicable indicators exist in the existing literature, we had to devise our own from scratch. These four types of behavior and corresponding qualitative indicators were specifically constructed both to be feasibly observable within the game itself (i.e., directly discernible from participants' in-game communication and their unit orders) and also to correspond to the SDO trait as described in the preceding chapters. These indicators were also consulted with multiple experienced players who considered them a good fit and something that ought to manifest quite clearly in participants' playstyles:

- Aggression: initiating conflicts, urging allies to war, attacking neutral parties, rapidly expanding
- Betrayal: breaking non-aggression agreements, stealing territory from allies, switching alliances to maximize gains
- Manipulation: lying to other players, attempting to turn them against each other, feeding them false intelligence
- Domination: ordering allies around, dictating moves to others, demanding concessions

Naturally, these are just some of the most commonly observable examples of these behaviors as they typically manifested themselves in the participants' playstyles, as captured by their logged in-game activities. A combined analysis of the player moves together with their messages proved crucial in understanding their plans, motivations, and strategies and to what extent their individual playstyles fit into these categories. Even sensing the tone of the messages and reading between the lines was relevant, which would prove tricky for any rigid automated method. The analysts had to be given considerable discretion and freedom to properly interpret and evaluate the behavior they could observe in participants' actions and communication.

All four of these attributes were scored on a scale of 1 to 6, with a higher value indicating more prevalent or the stronger presence of the behavior manifesting and the participants playstyle. The scores given by the individual analysts to each player were then averaged to increase reliability for the statistical calculations described in the next section. Given the inherently subjective and qualitative nature of this coding method, it was remarkably rather consistent (with SD = 0.62). Agreement between the coders was further emphasized by the Cronbach's alpha whose values for each year's run were α = .935 (2018), α = .932 (2019), respectively α = .946 (2020). This demonstrates that the independent analysts, despite lacking any strict logical or numerical rules for their evaluation, could agree among themselves exceptionally well on what constituted these forms of hostile behavior and how significant they were, thus signaling high reliability of the indicators and overall internal validity. In further assessing the reliability of the coding process and the agreement among the independent coders, Krippendorf's alpha was calculated for each of the four variables and reached the following values: aggression (α = .79), betrayal (α = .60), manipulation (α = .60), dominance (α = .67). All of the values met the minimal threshold of .60 for moderate reliability and aggression and dominance surpassed the .67 one (good reliability). This demonstrates that the independent analysts, despite lacking any strict logical or numerical rules for their evaluation, could agree among themselves relatively well on what constituted these forms of hostile behavior and how significant they were.

Results

Correlations Between SDO Scores, Behavioral Attributes, Gender, and Game Success

After analyzing the collected data using the IBM SPSS 27, we found that the SDO score (M = 3.49, Mdn = 3.50, SD = 1.14) was significantly correlated only with gender (men are associated with higher SDO values than women:

M = 3.71 vs. 3.20, *Mdn* = 3.75 vs. 3.13, *SD* = 1.13 vs. 1.09). This concurs with the mainstream literature on the connection between gender and SDO in other contexts (see e.g., Wilson & Liu, 2003). The four observed behavioral attributes positively correlated among themselves, as expected. However, the SDO score did not correlate significantly ($p > .05$) with any of them. Significance levels for the minor positive SDO score correlations were between $p = .065$ (for manipulation) and $p = .218$ (for betrayal). The in-game behavior was mostly uncoupled from their answers to the SDO questionnaire, thus playing in a manner they deemed best and overriding or disregarding their real-world traits. Furthermore, the SDO score's variables, the antiegalitarian (*M* = 3.28, *Mdn* = 3.25, *SD* = 1.22) and dominance (*M* = 3.71, *Mdn* = 3.75, *SD* = 1.28) scores, did not profess significant correlations with the variables of interest. In fact, the SDO score as a composite measure fared slightly better, possibly due to the aggregation of variance from both components.

Table 1. *Correlation Coefficients (r) of the Observed Variables.*

	Betrayal	Manipulation	Dominance	Gender	Game success	SDO score
Aggression	.60**	.60**	.78**	−.23*	.76**	.14
Betrayal		.81**	.56**	−.24**	.48**	.11
Manipulation			.66**	−.26**	.44**	.16
Dominance				−.27**	.62**	.13
Gender					−.17*	−.23**
Game success						.11

Note. *$p < .05$, **$p < .01$. Gender was coded as 0 for men, 1 for women. Point-biserial correlation was used.

Behavioral Attributes and Their Impact on Game Success

We also explored which parameters might have had predicted success at this particular game (success being operationalized as the number of "supply centers" controlled by the player at the end of the game). A simple initial correlation check (Table 1) revealed that in-game behavior significantly correlates ($p < .01$) with that player's final outcome, while the SDO score does not correlate significantly with one's success at the game. Given the opportunity, we also analyzed the role of the player's gender. Gender correlated negatively and significantly, but weakly with every one of the four observed behavioral attributes, and crucially, with game success (Table 1).

As a next step, we created a model of in-game behavior consisting of the four predictors, categorized game success as an outcome, and performed multinomial logistic regression on it. The model showed a good fit ($p < .001$). The aggression (*M* = 3.62, *Mdn* = 3.70, *SD* = 1.34) and betrayal (*M* = 2.71, *Mdn* = 2.40, *SD* = 1.24) predictors were clearly significant, those of manipulation (*M* = 2.97, *Mdn* = 2.70, *SD* = 1.26) less so, and dominance (*M* = 3.44, *Mdn* = 3.30, *SD* = 1.30) was clearly not. Acting in a dominant manner towards other players is not a statistically significant predictor for success at this strategy game. We then created a second model without the dominance variable. This showed a good fit ($p < .001$) as well as a slight improvement over the first model.[3] Looking more closely at the second model predictors (Table 2), we see that aggressive behavior and betraying other players fit the best, as well as, to a lesser degree, being manipulative.

Table 2. *Likelihood Ratio Tests for Game Success Based on Observed Behavioral Attributes.*

Effect	Model fitting criteria			Likelihood ratio tests		
	AIC	BIC	−2 LL	Chi-Square	*df*	*p*
Intercept	605.99	637.97	587.99	225.41	3	< .001
Aggression	522.11	554.09	504.11	141.53	3	< .001
Betrayal	393.29	425.26	375.29	12.7	3	.005
Manipulation	389.23	421.2	371.23	8.64	3	.034

The chi-square statistic is the difference in −2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all the parameters of that effect are 0.

The estimates of the predictors' coefficients, which can be referred to as effects on the outcome, are shown in Table 3 with the first category (defeat) being referential. We can see that the aggression predictor has the biggest effect on success. For example, if a player is more aggressive by 1 point (on a scale from 1 to 5), his chance of

scoring a huge success, i.e., ending up with 11 or more territories, rises almost 35 times. Particularly interesting are values below 1 that indicate a decreased chance. However, we must look at the confidence intervals (CIs) here and the only predictor that has, at least in one instance, both CI bounds below 1 is manipulation. A player who aims to have more than 11 territories should therefore refrain from being too manipulative as their chance of achieving the goal actually decreases. We also explored models with interaction effects. Out of all the possible combinations, only the interaction between aggression and manipulation was significant and thus not eliminated. However, by adding interactions, the resulting model's fitting criteria decreased significantly compared to the best model 2 (Table 2). Moreover, the aggression-manipulation effect was marginal, max. Exp(*B*) = 0.83.

Table 3. *Parameter Estimates of Multinomial Logistic Regression.*

Categories of success		*B*	*SE*	*p*	Odds ratio	95% CI for Exp(*B*)	
						Lower bound	Upper bound
2vs1	Intercept	−3.73	0.89	< .001			
	Aggression	0.51	0.29	.085	1.66	0.93	2.96
	Betrayal	0.14	0.39	.712	1.15	0.54	2.47
	Manipulation	−0.04	0.36	.914	0.96	0.48	1.94
3vs1	Intercept	−5.58	0.91	< .001			
	Aggression	1.5	0.28	< .001	4.48	2.61	7.71
	Betrayal	−0.25	0.3	.400	0.78	0.44	1.39
	Manipulation	−0.06	0.27	.824	0.94	0.56	1.59
4vs1	Intercept	−15.4	2.09	< .001			
	Aggression	3.55	0.5	< .001	34.81	13.03	92.99
	Betrayal	0.91	0.37	.015	2.48	1.2	5.14
	Manipulation	−0.91	0.36	.012	0.4	0.2	0.82

Note. 1st category denotes defeat (0 territory), and it represents the reference category, 2nd category denotes survival (1–3 territories), 3rd success (4–10), and 4th huge success (11 and more).

Discussion

Player Behaviour and SDO

After analyzing the data and reviewing the results, it would be difficult to claim that it is possible to infer a player's true personality traits purely from their observed in-game behavior. Our study shows that, at least in this particular game, players are able to separate these two aspects, thus observing only one of them does not enable us reliably to predict the other, in either direction. The lack of correlation between each of the four observed behavioral attributes and the SDO score indicates that the players mostly did not "play as themselves". This finding leans against the majority of the previous research done on player modelling and profiling that usually found at least some significant correlations between the measured personality traits and in-game behavior (see section Related work).

We are unfortunately lacking a referenceable body of similar research performed on similar games as well as any causal theory or research framework to explain this lack of consistency. Therefore, we are left to speculate on its root. First of all, it is necessary to reiterate that this study took place under specific circumstances, which were neither as tightly controlled as laboratory experiments, nor were they completely "natural" multiplayer gaming sessions. The players were aware that the games were being recorded and observed, but their innate goal was to simply play to win, not just to participate. Secondly, unlike games that were researched previously, Diplomacy is a strategy game, where players compete against each other in an anarchic, zero-sum environment. This is in stark contrast to narrative, role-playing, or sandbox games, so it should not come as altogether surprising to see results that trend differently.

These two aspects combined together could have potentially nudged players to essentially optimize their in-game strategy and behavior towards a more aggressive and dishonest, and therefore successful, playstyle. This strategic calculus is quite plausible given that the player sample consisted mostly of undergraduate students already at least somewhat familiar with military history and the realist school of thought on international relations. They

could have easily arrived at the conclusion that, in this rather lawless and ruthless environment, being overly nice does not pay off. It should be noted, however, that they also ran the risk of possibly "over-optimizing" their strategy, as the results for manipulative behavior in Table 3 show possible backfiring.

This possibility also implies that these results might be specific to students of this particular field and, therefore, non-students or students of other subjects might perform and behave differently (see Hanel & Vione, 2016 for the heterogeneity of student populations). Their pre-existing expectations, stemming from the name and reputation of the game or even based on hearsay from senior students, could also be contributing factors which were practically impossible to control for in our setting.

But even with players consciously drifting towards increased hostility, one would still expect to see correlation here due to higher-SDO players (more than $M = 3.49$, $SD = 1.14$ in our study's context) having a natural advantage and stronger inclinations for it. Or did the lower-SDO players (i.e., the "nice" ones), for whatever reason, somehow overcompensate to "catch up"? Perhaps the high-SDOs felt more confident and thus less likely to optimize? Or maybe there is a completely different explanation altogether. Unless, of course, the players really completely dissociated their in-game personas from their real-world ones in the game.

Either way, we do not want to venture much further than our data permit us. The goal of this paper is to simply present the results of our study and let them speak for themselves. It seems clear to us that significantly more empirical research needs to be done in this field before we can arrive at theories to make sense of it all.

Player Behavior and Success

Regarding our secondary objective, while we rather clearly saw that players exhibiting more hostile playstyle were more successful, it needs to be stressed that this result cannot be straightforwardly generalized beyond our particular case. It might very well be the case for many other games, but the results herein presented do not mean that it is universally more effective or advantageous to "play evil." Nor should it be interpreted from these results that competitive advantage is a product of toxic behavior, which was not a subject of this study, as discussed in the introduction. It seems highly plausible that it is a function of specific rules and game mechanics, but the virtual community and social pressures could also play a part. It could, however, with further research, help explain why some games seem to have communities which overall seem more hostile.

Finally, given the preceding results and the correlation between being a woman and being less aggressive, manipulative, treacherous, domineering, and successful, we can assume (the data only allow for that much speculation) a causal relationship here, namely that women tend to behave with less hostility, which makes them marginally less successful in this particular game.

Conclusion

Based on the results of our research using the turn-based, player-versus-player strategy game Diplomacy, players' in-game behavior does not seem to be a direct expression of their personality traits, contrary to common expectations, so we must reject H1. We found no statistically significant correlations between the collected player social dominance orientation scores and their corresponding observed in-game behavior such as aggression, betrayal, manipulation, and domination. Moreover, success at the game was strongly and significantly correlated with the majority of these behavioral attributes recorded within the game but not correlated with the SDO score.

Given the published research in this field, this leads us to conclude that the expression of these traits is modulated by the game environments and circumstances, thus producing considerable differences in reported findings across different games. In other words, the game itself might be nudging players towards optimizing their playstyles to achieve success, which in our case meant playing in a more hostile manner. Nevertheless, this level of observed in-game hostility still did not coincide with corresponding out-of-game personality traits, as measured by the SDO scale. It must be reiterated that these results cannot be simply generalized to all players or all games and more research in this area is necessary, and we strongly encourage it.

Footnotes

[1] For more details about the game rules, see https://www.backstabbr.com/how-to-play.

[2] The research followed ethical guidelines, subject protections, risk minimization, selection, and inclusion principles consistent with the APSA Principles and Guidance for Human Subjects Research.

[3] The second model correctly estimated the outcome of 73.3% cases, while the first one estimated 72.0%.

Conflict of Interest

The authors have no conflicts of interest to declare.

Authors' Contribution

Jakub Drmola: conceptualization, investigation, methodology, resources, writing—original draft, writing—review & editing. **Jan Kleiner:** formal analysis, methodology, writing—original draft, writing—review & editing.

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