On the Relevance of Irrelevant Strategies*

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Abstract

We experimentally examine whether adding seemingly irrelevant strategies to two-player simultaneous games affects players' behavior. We find evidence that irrelevant strategies, such as a dominated strategy or a strategy that is completely identical to an existing one, have a significant impact on the game's outcome. In coordination games, adding a dominated strategy increases both the likelihood that players choose the strategy which dominates it and the likelihood that their opponents best respond to the dominating strategy. Similarly, duplicating a strategy increases its choice share and the choice share of the opponents' best response to it. In games with a single equilibrium, the effect of adding an irrelevant strategy generally disappears. Consequently, we suggest that an irrelevant strategy may affect players' behavior, but only in situations in which it serves a strategic purpose, such as resolving a coordination problem. To account for our findings, we suggest an adapted level-k model in which a level-0 type is predictably affected by the irrelevant strategies and thus higher types are affected as well.

Keywords: Coordination, Dominated Strategy, Level-k, Attraction effect, Experiment.
JEL Codes: C91, D91

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1 Introduction

Suppose that two public transportation companies are planning a bus line from one city to another. Both are considering either an express line that drives directly between the cities' central stations or a local-town line that stops in several small towns along the way. Let's further suppose that demand for these lines is such that if they choose different lines, both will make nice profits but the express line will earn more. If they choose the same type of line, they split the demand for that line and both earn less than in the previous case. Table 1(a) shows their potential payoffs for each choice.

Now imagine that one of the companies is considering an additional option: A local-village line that stops in a couple of rural villages in between the smaller towns and is expected to generate the same payoffs as the local-town line regardless of the competing company's strategy. As in the first scenario, each company chooses only one line. This situation is depicted in Table 1(b). Would the companies' likelihoods of choosing one type of bus line over the other change due to this strategically duplicated option? Would the likelihood change if the local-village line is expected to generate slightly lower payoffs than the local-town line, regardless of the competing company's strategy (i.e., it is a strictly dominated strategy)?

In standard solution concepts in game-theory (e.g., Nash equilibrium, correlated equilibrium and rationalizability[1]), such duplicated and dominated strategies are deemed irrelevant, in the sense that the game's outcome would not change whether these strategies are included in the strategy space or not. At the same time, the experimental literature on non-strategic individual choice has repeatedly documented how seemingly irrelevant options, systematically shift decision makers' choices. Inspired by findings from the individual choice literature, in this paper we design an experiment to examine whether adding seemingly irrelevant strategies to a game affects the game's outcome.

Table 1: Public Transport Example

Table 1(a)

	Local-Town	Express
Local-Town	40,40	**60,80**
Express	**80,60**	50,50

Table 1(b)

	Local-Town	Express
Local-Town	40,40	**60,80**
Local-Village	40,40	**60,80**
Express	**80,60**	50,50

Notes: In Table 1(a) both companies are considering two lines. In Table 1(b) the company in the row position considers three lines. Equilibria are in bold.

[1] These solution concepts were introduced by Nash (1951), Aumann (1974), and Pearce (1984) and Bernheim (1984), respectively.

In this paper we experimentally study the addition of two types of irrelevant strategies. The first is a strategy that yields a lower payoff than another, regardless of the opponents' actions, i.e., a strictly dominated strategy. Clearly, players who maximize their payoffs would never choose this option. Therefore, their opponents would also ignore it under any solution concept in which players believe that others are payoff maximizers. The second type is a strategy that is entirely identical to an existing one in terms of both players' payoffs. Unlike a strictly dominated strategy, payoff maximizing players *may* choose this strategy because they would clearly be indifferent between the two identical strategies. However, under standard solution concepts, the presence of the duplicated strategy should not lead any of the duplicated strategies to be chosen instead of the player's other strategies. Consequently, this addition should not affect their opponents' choices either. Thus, both types of added strategies should not affect the standard game-theoretic analysis of the interaction.

In our experiment, we add such irrelevant strategies to eight simultaneous-move one-shot 2x2 matrix-form *base games*. Four of these base games are symmetric *coordination games* in which there are two equilibria, each of which is preferred by a different player. Coordination games are a natural starting point to examine the effect of irrelevant strategies on how play unfolds since they present players with an inherent difficulty of choosing one equilibrium over another. In these situations, cues–such as the irrelevant strategies we introduce–may serve as an informal guideline for players to follow. However, studying these games alone does not allow to disentangle individual-based effects of irrelevant strategies, i.e., the effects that arise in individual choice problems, from effects that are due to strategic considerations. The other four games used in our experiment, called *single-equilibrium games*, are strategically simpler than coordination games (although by no means trivial). As we discuss below, in single-equilibrium games there is no strategic role for irrelevant strategies and hence any evidence for their influence shall be interpreted as an individual-based effect rather than a strategic effect. Thus, examining the single-equilibrium games *alongside* the coordination games brings about our ability to distinguish between the two potential psychological mechanisms.

For each base game we construct two 3x2 *extended games* in which we add an irrelevant strategy to the row player's original strategy set. The added strategy is either dominated by only one of the original strategies, i.e., it is asymmetrically dominated, or a duplicate of one of the original strategies. We examine three aspects of the added strategy's effect on the games' outcomes. First, the *direct effect*, i.e., the change in behavior of the row players across base games and extended games. Second, we look into the *indirect effect* of the added strategy, i.e., the difference in behavior of the column players. Finally, in the coordination games, we test whether players coordinate on the equilibrium that corresponds to the direct and indirect effects more frequently in the extended games than in the base games.

We find that irrelevant strategies affect players' choices in coordination games. First, in terms of the direct effect, adding an asymmetrically dominated strategy to the row players increases the relative choice share of the strategy that dominates it, and duplicating a strategy increases the likelihood that it will be chosen. Second, these additions seem to be taken into account by the column players: They are more likely to choose the best response to the row player's strategy whose choice frequency increased in the extended games. These findings do not show up in the single-equilibrium games which suggests, as explained in Sections 3 and 4, that a dominating or duplicated strategy does not trigger an individual-based response. Rather, it seems that in coordination games players use the added strategy as a coordination device: they focus their attention and synchronize their actions on one of the two equilibria, which becomes more prominent due to the asymmetric addition. Indeed, we find that coordination rates are significantly higher in the presence of the seemingly irrelevant strategy.[2]

Unlike the classic approach, which deems dominated and duplicates strategies as irrelevant, several behavioral models, such as Quantal Response Equilibrium (QRE) (McKelvey and Palfrey, 1995), level-k (Stahl and Wilson, 1994, 1995) and Sampling equilibrium (Osborne and Rubinstein, 1998), *do* allow for an irrelevant strategy to affect play. While the standard versions of these behavioral models are unable to qualitatively explain our main findings, in Section 4 we suggest *an adapted* level-k model that is able to do so.[3]

Our examination of the effect of adding an asymmetrically dominated strategy draws upon the individual choice literature on the *attraction effect* (Huber et al., 1982). This "menu-effect" arises when a decoy option, c, is added to a two-alternative set $\{a, b\}$ (see Figure 1-Attraction). When the decoy is dominated by one alternative (a in Figure 1-Attraction) but not by the other, choices have been found to shift in the direction of the dominating alternative (the "target"). The experimental evidence for this effect in non-strategic choice problems is large and spans a variety of goods, services and even perceptual decision tasks.[4] Most of the psychological mechanisms that were suggested as explanations for the attraction effect share the idea that the dominating alternative b shines brighter when the decoy alternative is present. This may be due to reason-based approaches, as in Lombardi (2009) and de Clippel and Eliaz (2012), which hinge on ideas raised in Simonson (1989), Tversky and Simonson (1993) and Shafir et al. (1993). It may also stem from dimensional weights (Tversky et al., 1988; Wedell, 1991) or from focusing on different consideration sets (Ok et al., 2015).

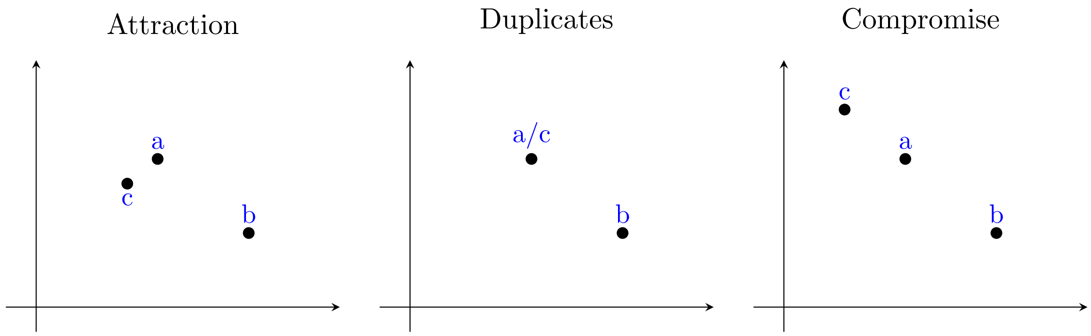
The exploration of the effect of a duplicated strategy on players' behavior, which we call the *duplicates effect*, is also inspired by the individual choice literature. It refers to the

[2] Note that irrelevant strategies cannot affect equilibrium selection, according to standard equilibrium refinements, such as perfect equilibrium (Selten, 1988) and proper equilibrium (Myerson, 1978).

[3] For example, the standard QRE response function predicts that the ratio between the probabilities with which two strategies are chosen should not change across a base game and its extensions. Standard level-k reasoning cannot explain the observed effect of dominated strategies.

[4] See, among many others, Wedell (1991); Ariely and Wallsten (1995); Dhar and Glazer (1996); Doyle et al. (1999); Scarpi (2008); Hedgcock et al. (2009); Trueblood et al. (2013). A more critical view has been raised by Frederick et al. (2014) and Yang and Lynn (2014) while Huber et al. (2014) and Simonson (2014) provide a response.

Fig. 1: Attraction, Duplicates and Compromise Effects in a Two-Attribute-Space



Notes: The attraction and compromise effects refer to the increase in the choice share of a due to the addition of c. The duplicates effect refers to an increase in the choice share of a and c compared to the choice share of a when c is absent.

increase in choice share of an existing option due to an addition of an alternative that is essentially identical to it (See Figure 1-Duplicates). It has been discussed by (McFadden et al., 1973) in his famous blue-bus/red-bus example. Similar examples have also been raised by Debreu (1960) and Tversky (1972) to demonstrate a problem that may arise in Luce's random utility model (Luce, 1959), according to which adding a duplicate of an existing option in a choice set would increase the combined choice share of the duo. This problem is known in the literature as the duplicates problem and is discussed by Gul et al. (2014). We are aware of only one experiment that addresses the duplicates problem in individual choice conducted by Becker et al. (1963), and in which most of the subjects are not affected by the duplicated option. However, many studies in psychology have examined the closely related *similarity effect* in which an option c, which is very similar to an existing option, a, but not identical to it, is added to the choice set. In these studies, the choice share of a relative to b drops in the presence of the similar alternative, c. More relevant for our work is the additional finding, often overlooked, that the combined share of choices of a and c is larger than the share of a when c is not available (though this may be explained by rational choice, as a and c are not identical).[5] There are no well-accepted individual mechanisms underlying the emergence of the duplicates effect. We suggest that having one product appear twice highlights its presence and may therefore enhance it in the eyes of the decision maker. Another potential channel for individuals' higher tendency to choose a duplicated option may lie in naive diversification, i.e., the tendency to spread choices evenly among existing options (as documented, for example, by Benartzi and Thaler, 2001, in asset allocation decisions).

Our paper focuses on the relevance of irrelevant strategies but, nevertheless, we decided

[5]For a recent review of the similarity effect, see Wollschlaeger and Diederich (2020).

to place another well-known menu-effect from the individual choice literature, the compromise effect, under strategic scrutiny. This effect emerges when a *relevant* yet extreme option that is added to the choice set leads decision makers to view one of the original options as a compromise. More specifically, as shown in Figure 1-Compromise, when c is added to a doubleton set $\{a, b\}$, the preferences shift in the direction of the midway alternative a.[6] Equivalently, in our setting, if the strategy a yields a higher payoff for the row player than b when the column player plays one strategy, but yields a lower payoff than b when the column player plays his other strategy, then the row player's added strategy c yields an even higher payoff in the former case and an even lower payoff in the latter. Thus, the strategy a becomes a compromise strategy. As we elaborate later, the investigation of this added relevant strategy provides another angle on the mechanism behind menu-effects in strategic interactions.

Overall, our experimental findings suggest that individual-based menu-effects do not automatically translate into strategic environments. Rather, in some circumstances, the same cues that affect behavior in individual choice problems may serve a strategic purpose such as facilitating coordination. Specifically, the added dominated and duplicated strategies generate an asymmetry between the two original strategies - one has a special relation with the added strategy and the other does not. This asymmetry makes one strategy salient due to "psychological superiority", either as a dominating action or due to its increased visibility as a duplicated action. Consequently, its corresponding equilibrium becomes more prominent, which, in turn, improves coordination.

Two studies have examined the attraction effect in matrix form games. Colman et al. (2007) find evidence of an attraction effect in games in which an asymmetrically dominated strategy is added to *both* players' strategy set. In coordination games, Amaldoss et al. (2008) add an asymmetrically dominated strategy to one of two players and find that they exhibit an attraction effect but their opponents do not seem to take this effect into account.[7] We contribute to this literature by taking a more general perspective on the effect of irrelevant strategies. We examine both duplicated and dominated strategies in two types of games. Analyzing them in concert allows us to shed light on the underlying mechanism and suggest a behavioral model that may predict the influence of irrelevant strategies in many strategic situations; The model we introduce is a novel specification of a level-k model whereby the level-0 type is attracted to the target strategy due to its increased salience.

Recently, Galeotti et al. (2021) explore whether the attraction and the compromise effects arise in bargaining games. Their work looks at menu-effects from the point of view of cooperative games. In the experiment they set up, two players need to agree on an allocation, or else they receive nothing, and are allowed to chat freely and make offers

[6] This effect has also been widely studied in various contexts, such as consumer choice (Simonson and Tversky, 1992), investments (Geyskens et al., 2010) and voting (Herne, 1997). See Lichters et al. (2015) for a review.

[7] Amaldoss et al. (2008) find an indirect effect only when the game is repeated and feedback is provided.

until they reach an agreement. In the base games, there are two possible allocations, each one preferred by a different player. In the "dominance extension", there exists another allocation that is Pareto dominated by one of the original allocations but not the other. In their "compromise extension", after adding a third allocation, one of the original allocations becomes second best for both players. Thus, their base game is equivalent to a $2X2$ coordination game, with 2 equilibria, and the extensions are equivalent to $3X3$ coordination games with 3 equilibria. They find that players coordinate on equilibrium in a manner that is consistent with the attraction and compromise effects.[8]

Taking a broad view, our work complements Galeotti et al. (2021) as they explore menu-effects in *cooperative* games while we explore menu-effects (with a strong emphasis on irrelevant strategies) in *non-cooperative* games. Zooming in on the details, reveals that their setting is quite different from ours. In terms of the strategies of each player, they create no dominance, nor compromise, relation. For example, it is optimal for a player in their experiment to choose the Pareto dominated allocation if the opponent chooses it. Thus, there are no irrelevant strategies in their extended games. In other words, they focus on whether the *pair of players* are affected by an added *equilibrium* while we focus on whether the *individual player* is affected by an added irrelevant *strategy* (and also whether this added strategy affects the opponent).

As is evident from the last three paragraphs, the experimental literature on menu-effects in strategic interactions is very small. By exploring two types of irrelevant strategies–one of which has never been looked at before–in two different types of games, we provide the most comprehensive take on this topic so far.

The paper proceeds as follows. In Section 2 we describe the experimental design and in Section 3 we report the results. Section 4 introduces an adapted level-k model that accounts for our findings and Section 5 concludes.

2 Experimental Design

Our experiment consists of eight two-player simultaneous-move base games, four coordination games and four single-equilibrium games. In the coordination games, each player has the dilemma of whether to choose the action that leads to his preferred equilibrium or the action that leads to the opponent's preferred equilibrium. In the single-equilibrium games, players have to choose between the action that is part of the equilibrium play or the action that is part of the surplus maximizing outcome.

For each game, we construct three extended games—*dominance extension*, *duplicates extension* and *compromise extension*. The extended games are constructed by adding a third strategy to the row player's strategy set so that it becomes a 3x2 game. This strategy is either dominated by the top row of the original base game (which is the *target strategy*),

[8] Evidence for the compromise effect in similar bargaining environments is also found in Galeotti et al. (2019).

Table 2: Payoffs of Base Games 1 (Coordination) and 5 (Single-Equilibrium) and Their Extensions

	Base		Attraction Extension		Duplicate Extension		Compromise Extension	
Game 1 (Coordination)	40,40	**50,80**	40,40	**50,80**	40,40	**50,80**	10,30	**80,30**
	80,50	30,30	35,20	45,20	40,40	**50,80**	40,40	50,80
			80,50	30,30	**80,50**	30,30	**80,50**	30,30
Game 5 (Single-Equilibrium)	40,40	**50,50**	40,40	**50,50**	40,40	**50,50**	20,40	**60,40**
	80,80	30,90	35,30	45,30	40,40	**50,50**	40,40	50,50
			80,80	30,90	80,80	30,90	80,80	30,90

Notes: In every base game the row player's strategies are Top and Bottom while in the extensions, they are Top, Middle and Bottom. The column player has two options – Left or Right. Equilibria are in bold.

identical to it, or more extreme with respect to it. Thus, we investigate the behavior in 32 games: 8 base games and 3 extended games for each base game. To mitigate subjects' fatigue, 4 unrelated games, which were not presented in matrix-form, were interspersed in between the other games. Table 2 shows one of the coordination base games and one of the single-equilibrium base games alongside their three extensions. All base games, their extensions and experimental details regarding our choice of payoff matrices appear in Appendix A.

We carried out a computerized lab experiment with a between-subject design, i.e, choices of subjects who played the base games were compared to choices of different subjects who played extensions of the same games. Subjects were randomly and equally assigned to two groups. In each group, subjects played four base games as row players and the additional four base games as column players. Subjects who played a base game as row players, played all three extensions of that base game as column players, and vice versa. Moreover, a base game and its extension, or two extensions of the same base game, were separated by at least two other games (extensions/base games of the other 7 games or one of the 4 unrelated games). To control for order effects, subjects in each group played the games in two opposing orders. In each game, a player was randomly matched with a different anonymous opponent, and for each player, one game was randomly chosen for payment purposes. The subjects received feedback on the games' outcomes only at the end of the experiment.

The experiment was pre-registered on the AEA RCT Registry (Arad et al., 2019). It was held in the Interactive Decision Making Lab of The Coller School of Management at Tel Aviv University. We ran 21 sessions that included 238 subjects (an average of 11 students per session). Subjects were undergraduate students registered with the lab who came from various fields of studies. Instructions were displayed on subjects' screens and read out loud by the experimenter.[9] Following the instructions, subjects were acquainted with matrix

[9] The instructions appear in Appendix B.

form games in a training session that included 5 matrix-form games and 8 questions with feedback. Each session lasted roughly 45 minutes and subjects' average payoff was 75 ILS (25 ILS show-up fee plus 50 ILS on average earned during the experiment), which were roughly equivalent to 22 USD at the time.

3 Results

3.1 Irrelevant Strategies

We present the results of the direct effect of the added strategy on the row players, followed by the indirect effects on the column players and coordination rates. Throughout the analysis, the top row of the relevant base game is the target strategy. (In the duplicates extensions we consider both copies of the duplicated strategy, Top and Middle, as the target.)

Before we proceed to the results, note that out of 476 choices made by the row players in the dominance extensions, there were only 17 choices (3.6%) of the dominated strategy in the coordination games and 13 such choices (2.7%) in the single-equilibrium games. This provides suggestive evidence that subjects were aware that this strategy is dominated by another. Since our main interest lies in the ratio of choices of the two strategies of the base game, the table and the regression analysis below excludes choices of the dominated strategy.

Table 3 shows the percentages of choices of the target strategy by row players in each game. In the coordination games (1-4), the target is chosen more frequently when the irrelevant strategy is present: there is an increase of 3%-11% in the dominance extension and of 10%-25% in the duplicates extension. In single-equilibrium games, the irrelevant strategy has a small and seemingly insignificant effect on the row player. Adding a dominated strategy increases the choice frequency of the target strategy by 0%-9% while duplicating a strategy increases its choice frequency by 0%-5%.

Next, we pool together choices for all games of the same type and run logistic regressions in which the dependent variable is a dummy that receives 1 if the target strategy was chosen

Table 3: Percentages of Target Choices by Row Players

	Coordination				*Single-Equilibrium*			
	1	2	3	4	5	6	7	8
Base Game	59	51	59	56	46	44	54	49
Dominance Extension	62	62	62	66	52	53	54	53
Duplicates Extension	73	76	75	66	49	49	54	51

Table 4: Logistic Regression Models: Coordination Games

	Dependent variable: Target Choice					
	Dominance Extension			Duplicates Extension		
	(1)	(2)	(3)	(4)	(5)	(6)
Extension	0.28**	0.28**	0.45**	0.71***	0.71***	1.19***
	(0.13)	(0.12)	(0.20)	(0.14)	(0.12)	(0.22)
Order	-0.05	-0.05		-0.06	-0.06	
	(0.14)	(0.17)		(0.14)	(0.18)	
Gender (male=1)	-0.10	-0.10		0.01	0.01	
	(0.13)	(0.17)		(0.14)	(0.18)	
correct	0.12	0.12		0.07	0.07	
	(0.09)	(0.14)		(0.09)	(0.13)	
$game_2$	-0.15	-0.15	-0.26	-0.11	-0.11	-0.19
	(0.19)	(0.17)	(0.28)	(0.20)	(0.18)	(0.30)
$game_3$	0.01	0.01	0.01	0.04	0.04	0.06
	(0.19)	(0.18)	(0.30)	(0.20)	(0.18)	(0.30)
$game_4$	0.04	0.04	0.06	-0.23	-0.23	0.39
	(0.19)	(0.17)	(0.28)	(0.19)	(0.18)	(0.31)
Constant	-0.49	-0.49	-0.18	-0.16	-0.16	-0.46**
	(0.75)	(0.75)	(0.21)	(0.75)	(1.04)	(0.20)
Observations	935	935	639	952	952	644

Notes: Numbers represent coefficients (β), std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

and 0 otherwise.[10] The main explanatory variable is a dummy that receives 1 when the game is presented in the extended form and 0 for the base form. We control for the game, order in which questions were presented, gender and number of correct answers in the training session.[11] We run three specifications for each effect for each type of game: (*i*) non-clustered errors, (*ii*) clustered errors at the game level, and (*iii*) clustered errors at the game level alongside subject fixed effects.

Tables 4 and 5 report the results of our logistic regressions and provide further evidence for the effect of adding the irrelevant strategy. The coefficient of the extension variable in coordination games is positive and significant at the 5% level in all specifications (odds ratio ranging from 1.32 to 1.56 in the dominance extension, and from 2 to 3 in the duplicates extension). In the single-equilibrium games, however, we do not find a consistent effect of the extensions on row players' choices.

Moving on to indirect effects, we examine whether extending the row player's strategy space has an effect on the column player's behavior. We define the column player's target strategy as the best-response to the row player's target strategy. Table 6 shows the percentage of choices of the target by column players. In coordination games, the percentage of target choices is significantly higher in both dominance and duplicates extension games

[10] OLS regressions lead to the same qualitative results.

[11] Running the regressions without the controls does not have any qualitative effects on the results.

Table 5: Logistic Regression Models: Single-Equilibrium Games

	Dependent variable: Target Choice					
	Dominance Extension			Duplicates Extension		
	(1)	(2)	(3)	(4)	(5)	(6)
Extension	0.19	0.19*	0.45**	0.10	0.10	0.24
	(0.13)	(0.10)	(0.22)	(0.13)	(0.09)	(0.21)
Order	0.16	0.16		0.12	0.12	
	(0.13)	(0.19)		(0.13)	(0.19)	
Gender (male=1)	0.23*	0.23		0.16	0.16	
	(0.13)	(0.19)		(0.13)	(0.19)	
correct	0.14	0.14		0.06	0.06	
	(0.09)	(0.11)		(0.09)	(0.11)	
$game_6$	-0.04	-0.04	-0.10	-0.05	-0.05	-0.13
	(0.19)	(0.15)	(0.32)	(0.18)	(0.14)	(0.31)
$game_7$	0.19	0.19	0.39	0.25	0.25*	0.56*
	(0.19)	(0.15)	(0.33)	(0.18)	(0.15)	(0.34)
$game_8$	0.08	0.08	0.15	0.10	0.10	0.21
	(0.19)	(0.13)	(0.28)	(0.18)	(0.15)	(0.33)
Constant	-1.54**	-1.54*	0.796***	-0.90	-0.90	0.85***
	(0.76)	(0.90)	(0.20)	(0.73)	(0.93)	(0.21)
Observations	939	939	510	952	952	528

Notes: Numbers represent coefficients (β), std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

compared to the base games. This suggestive evidence of an indirect effect is further supported by the regressions that are presented in Table 7. According to the regressions' coefficients, compared to the base game, the column player is between 1.75 to 2.6 times more likely to choose the target when a dominated strategy is added to the row player, and 3 to 6 times more likely to choose it when the row player's target strategy is duplicated. In the single-equilibrium games, however, there is no significant effect on the column players behavior (see the regression results in Table 8).

Table 6: Percentages of Target Choices by Column Players

	Coordination				*Single-Equilibrium*			
	1	2	3	4	5	6	7	8
Base Game	41	48	48	46	53	55	46	50
Dominance Extension	50	61	61	65	46	58	49	55
Duplicates Extension	68	76	62	78	63	57	46	51

Table 7: Logistic Regression Models: Column Players' Response in Coordination Games

	Dependent variable: Target Choice					
	Dominance Extension			Duplicates Extension		
	(1)	(2)	(3)	(4)	(5)	(6)
Extension	0.56***	0.56**	0.981**	1.07***	1.07***	1.78***
	(0.13)	(0.11)	(0.20)	(0.14)	(0.12)	(0.23)
Order	0.08	0.08		0.06	0.06	
	(0.13)	(0.17)		(0.14)	(0.17)	
Gender (male=1)	0.19	0.19		0.06	0.06	
	(0.13)	(0.17)		(0.14)	(0.17)	
correct	-0.03	-0.03		0.01	0.01	
	(0.09)	(0.09)		(0.09)	(0.08)	
$game_2$	0.36*	0.36**	0.68**	0.32	0.32*	0.49
	(0.19)	(0.16)	(0.28)	(0.19)	(0.17)	(0.30)
$game_3$	0.36*	0.36**	0.62**	0.02	0.02	0.03
	(0.19)	(0.17)	(0.30)	(0.19)	(0.18)	(0.30)
$game_4$	0.40**	0.40**	0.74***	0.34*	0.34*	0.52*
	(0.19)	(0.17)	(0.28)	(0.19)	(0.17)	(0.30)
Constant	-0.44	-0.44	0.13	-0.54	-0.54	-2.58***
	(0.74)	(0.76)	(0.20)	(0.76)	(0.70)	(0.30)
Observations	952	952	680	952	952	704

Notes: Numbers represent coefficients (β), std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

Table 8: Logistic Regression Models: Column Players' Response in Single-Equilibrium Games

	Dependent variable: Target Choice					
	Dominance Extension			Duplicates Extension		
	(1)	(2)	(3)	(4)	(5)	(6)
Extension	0.05	0.05	0.09	0.15	0.15	0.33
	(0.13)	(0.10)	(0.23)	(0.13)	(0.10)	(0.22)
Order	-0.39***	-0.39**		-0.37***	-0.37*	
	(0.13)	(0.19)		(0.13)	(0.20)	
Gender (male=1)	0.16	0.16		0.16	0.16	
	(0.13)	(0.19)		(0.13)	(0.20)	
correct	-0.34***	-0.34**		-0.28***	-0.28**	
	(0.10)	(0.15)		(0.10)	(0.13)	
$game_6$	0.28	0.28*	0.60*	-0.09	-0.09	-0.17
	(0.19)	(0.14)	(0.31)	(0.19)	(0.13)	(0.29)
$game_7$	-0.09	-0.09	-0.19	-0.48***	-0.48***	-1.07***
	(0.19)	(0.14)	(0.31)	(0.19)	(0.15)	(0.34)
$game_8$	0.12	0.12	0.26	-0.31*	-0.31*	-0.67*
	(0.19)	(0.13)	(0.29)	(0.19)	(0.16)	(0.36)
Constant	3.09***	3.09***	0.91***	2.85***	2.85***	1.46***
	(0.82)	(1.19)	(0.19)	(0.80)	(1.07)	(0.24)
Observations	952	952	524	952	952	504

Notes: Numbers represent coefficients (β), std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

Table 9: Coordination Rates

	Base		Dominance		Duplicate	
Game 1	33	**26***	33	**28***	26	**47***
	26	15	**17**	21	**6**	21
Game 2	**24***	28	**37***	24	**55***	21
	24	**24**	24	**13**	21	**3**
Game 3	**30***	29	**36***	24	**50***	25
	18	**24**	24	**13**	13	**13**
Game 4	33	**24***	21	**40***	12	**54***
	21	23	**12**	19	**10**	24

Notes. Outcome distribution per coordination base game and corresponding extension. Numbers present percentages. Equilibria are in bold. Each game was played by 119 row players and 119 column players. The outcome reached by both players choosing their target is marked with *.

Coordination Rates

We focus on the coordination games and ask whether the introduction of the additional strategy increases coordination rates on the *target equilibrium*, i.e., the outcome that arises when both players choose their target strategy. Many studies have identified factors that facilitate coordination in two-player games (see Camerer, 2011 for a review). These include behavioral mechanisms, such as order of play (Amershi et al., 1992; Rapoport, 1997) and framing (Hargreaves Heap et al., 2014), as well as more rational factors such as the presence of an outside-option (Cooper et al., 1994), the game's symmetry (van Elten and Penczynski, 2020), recommendations (Van Huyck et al., 1992; Brandts and MacLeod, 1995) and communication (Cooper et al., 1994). We contribute to this literature by examining whether adding a dominated or duplicated strategy facilitates coordination.

Table 9 shows the percentages with which each of the coordination game's outcomes was reached. Recall that each player was randomly matched with another player in each game. The percentages in the table are calculated according to the outcome of play of this random matching.[12] Equilibria in each game appear in bold and the target equilibrium is marked with an asterisk.

It can be observed that the dominance and duplicates extensions increase coordination rates on the target equilibrium in all four games. The effect is relatively large in the duplicates extensions, in which the probability of reaching the target equilibrium is 47% – 55% compared to 24%-30% in the base games. The coordination increase in the dominance extensions is in the range of 2% to 16%.

[12]As we are interested in actual rates that the target equilibrium was reached, in this section we do not exclude choices of the dominated strategy. However, outcomes that involve these actions do not appear in Table 9.

Table 10: Logistic Regression Models: Target Equilibrium

	Dependent variable: Target Equilibrium			
	Dominance Extension		Duplicates Extension	
	(1)	(2)	(3)	(4)
Extension	0.45***	0.64***	1.11***	1.62***
	(0.14)	(0.17)	(0.14)	(0.18)
$game_2$	0.167	0.347	0.12	0.10
	(0.20)	(0.25)	(0.20)	(0.24)
$game_3$	0.30	0.46*	0.15	0.15
	(0.20)	(0.24)	(0.20)	(0.24)
$game_4$	0.246	0.362	0.10	0.11
	(0.20)	(0.25)	(0.20)	(0.24)
Constant	-1.237***	-0.651***	-1.15***	-1.36***
	(0.167)	(1.03)	(0.16)	(1.16)
Observations	952	851	952	920

Notes: Numbers represent coefficients (β), Std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

We also run logistic regressions to examine the increase in reaching the target equilibrium for each extension, aggregated over the four coordination games (Table 10) while controlling for the games themselves. The dependent variable is a dummy that receives 1 if the target outcome was reached and 0 otherwise, and the main explanatory variable is the dummy for the relevant extension. For each extension, we run two specifications: the first (1 and 3) with no fixed effects and the second (2 and 4) with subject fixed effects. The regressions show a significant positive increase in the likelihood of reaching the target equilibrium when the game is presented in its dominance or duplicates extension form.

3.2 Relevant Strategy

The added strategy in the compromise extensions was chosen in 13.7% of the cases in the coordination games and 17.6% in the single-equilibrium games which is evidence of the fact that it is indeed perceived as a relevant strategy. Table 11 reports the relative choice share of the compromise strategy compared to the competing strategy (Bottom), excluding choices of the added strategy. There seem to be no significant differences in choice shares

Table 11: Percentages of Choices of the Compromise Strategy by Row Players

	Coordination				*Single-Equilibrium*			
	1	2	3	4	5	6	7	8
Base Game	59	51	59	56	46	44	54	49
Compromise Extension	53	51	63	54	39	36	48	47

Table 12: Logistic Regression Models: Compromise Effect in Coordination Games

	Dependent variable:		
	Choice of Compromise Strategy		
	(1)	(2)	(3)
Compromise Extension	-0.04	-0.04	-0.15
	(0.14)	(0.12)	(0.22)
Order	-0.02	-0.02	
	(0.14)	(0.18)	
Gender (male=1)	-0.27**	-0.27	
	(0.14)	(0.18)	
correct	0.05	0.05	
	(0.09)	(0.11)	
$game_2$	-0.18	-0.18	-0.38
	(0.19)	(0.17)	(0.32)
$game_3$	0.21	0.21	0.33
	(0.19)	(0.18)	(0.32)
$game_4$	-0.03	-0.03	-0.07
	(0.19)	(0.16)	(0.30)
Constant	0.01	0.01	1.2***
	(0.76)	(0.89)	(0.23)
Observations	887	887	562

Notes: Numbers represent coefficients (β), Std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

of the compromise strategy between base games and extensions. The logistic regressions in Tables 12 and 13 further support this impression as the coefficients on the extension dummy variables are not significant for any type of game.

Notice that in the compromise extensions, the added strategy is an equilibrium strategy in the extended game while the compromise strategy is not. Thus, more choices of the compromise strategy by the row players in the extensions could only be explained by an individual-based compromise effect. Consequently, our finding of no compromise effect is further evidence for the fact that individual-based biases do not automatically translate into strategic environments.

As for indirect effects, notice that in these extensions the column players' best response to the row players' middle strategy is the same as their best response to the added strategy. Therefore, column players' choices in these extensions do not allow to disentangle whether they expect to play a behavioral action of a row player, i.e., the compromise strategy, or a row player who is trying to reach the game's new equilibrium. Thus, we do not examine their behavior in this extension.

3.3 Discussion

In coordination games, we find that adding an irrelevant strategy in the form of a dominated/duplicated action assists in stirring the row players' actions in the direction of one

Table 13: Logistic Regression Models: Compromise Effect in Single-Equilibrium Games

	Dependent variable:		
	Choice of Compromise Strategy		
	(1)	(2)	(3)
Compromise Extension	-0.22	-0.22**	-0.15
	(0.14)	(0.11)	(0.23)
Order	0.12	0.12	
	(0.14)	(0.20)	
Gender (male=1)	0.13	0.13	
	(0.14)	(0.20)	
correct	0.03	0.03	
	(0.09)	(0.10)	
$game_6$	-0.12	-0.12	-0.35
	(0.20)	(0.17)	(0.35)
$game_7$	0.33*	0.33**	0.64*
	(0.19)	(0.17)	(0.36)
$game_8$	0.21	0.21	0.27
	(0.19)	(0.15)	(0.31)
Constant	-0.64	-0.64	1.06***
	(0.77)	(0.87)	(0.24)
Observations	868	868	469

Notes: Numbers represent coefficients (β), Std. errors in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

equilibrium over another. At the same time, the addition of these strategies has no effect on the row players' actions in single-equilibrium games, where the decision is whether to play an equilibrium strategy or a surplus maximizing strategy. The different patterns across types of games indicate that our row players' behavior is not a manifestation of individual-based biases, i.e., it is not simply an automatic reaction to the added strategy that arises without consideration of the strategic situation at hand.[13] It seems that the irrelevant added strategy impacts row players' actions through their desire for cues to facilitate coordination.

The column players choose to follow their target action, which is consistent with best responding to the target of the row player, more often in the extended coordination games. Moreover, just like the row players, they do not exhibit this pattern in the single-equilibrium games. Thus, it seems that the column players utilize the added strategy as a means for coordination, similarly to the row players.

Putting these behavioral patterns together, it seems that both row and column players may be thinking about the irrelevant strategy as a public coordination device. As our analysis confirms, these patterns of row and column players lead to higher coordination

[13] A naive (non-strategic) player would strip the strategic situation into a choice between two-state lotteries: one state for each of the column player's actions. If this were the case, we would expect similar findings in both types of games.

rates on the target equilibrium in the presence of the irrelevant strategy.

The addition of the extreme relevant strategy, does not seem to have any effect on the row players in any type of game. Notice that in this case the added strategy is part of a new equilibrium of the extended game. Thus, the potential for a behavioral reaction that corresponds to the compromise effect, i.e., a tendency to choose the middle strategy, is offset by strategic considerations of reaching an equilibrium. Given the above support for strong strategic considerations of our subjects, it is not surprising that when the added strategy is a legitimate choice for a strategic row player, its "behavioral role" in highlighting the middle action is attenuated.

4 An Adapted Level-k Model

In this section we interpret our findings through the lens of level-k thinking. A standard level-k model assumes that the population of players consists of a number of types that differ in their depth of reasoning (Stahl and Wilson, 1994, 1995; Nagel, 1995). A level-0 player is non-strategic and is assumed to choose each of the strategies with equal probability. For any $k \geq 1$, a level-k type best-responds to the belief that he faces a player of level $k-1$. The estimated distribution of types in experimental games is qualitatively stable across contexts and suggests that most of the players are either level-1 or level-2 types.

A level-k model with a standard level-0 row player, who chooses each action with equal probability, may explain the increase in the choice probability of a strategy when it is duplicated. However, it cannot explain a higher proportion of choices of the target in the dominance extension compared to the base game. In order to explain our findings with a level-k model, one would need to consider an adapted level-0 row player who is attracted to a strategy when it is highlighted as in the case of the *target* in our extended games. When no such highlighting takes place, this level-0 row player chooses uniformly from his set of available actions. This specification extends the strand of literature which assumes a level-0 type who is attracted to salient strategies (e.g., Crawford and Iriberri, 2007; Arad, 2012; Arad and Rubinstein, 2012; Hargreaves Heap et al., 2014). This is an apt adaptation, we argue, since the added irrelevant strategy highlights the target strategy by making it "psychologically superior". We discuss the qualitative predictions of such an adapted model and examine how behavior would change across base games and their extensions according to it.

Let us first consider the adapted model's predictions in single-equilibrium games. A level-0 row player tends to choose the target in the extensions with a higher probability than in the base game. A level-1 column player's best response is his dominant strategy both in the base games and in their extensions. Consequently, a level-2 row player chooses the target in the base games and in their extensions because it is the best response to the column player's choice of his dominant strategy. Since the target strategies support an equilibrium, higher level types also choose the strategies that constitute that equilibrium.

Note that a column player in our experiment has the same set of strategies in the base games and in their extensions and hence a level-0 column player behaves similarly in both cases. This implies that the behavior of a level-1 row player and a level-2 column player in the base game is similar to their behavior in the corresponding extensions. In sum, in single-equilibrium games, the only expected difference between the base games and their extensions is due to the behavior of a level-0 row player.

Now Consider the model's prediction in coordination games. In the base games, a level-0 row player chooses either strategy with probability 0.5, and hence a level-1 column player's best response may be either one of the two strategies, depending on his risk preferences. In the extensions, however, given a belief that a level-0 row player chooses the target with high enough probability, any moderately risk averse (or risk neutral) level-1 column player will choose his target in the extended game. Therefore, the proportion of the level-1 column players' choice of the target is higher in the extension than in the base game.[14] Assuming such level-1 behavior, level-2 row players choose the target in the extensions with a higher probability than in the base games. Here again, since the target strategies support an equilibrium, in the extensions, higher level types should also choose the strategies that constitute that equilibrium.[15]

Table 14 summarizes the qualitative predictions above. In light of these predictions, it appears that the aggregate experimental data is consistent with the model. Viewed through the lens of the level-k model, our combined findings from both types of games suggest that there are no grounds to support the existence of non-strategic level-0 row players who are attracted to the target (i.e., level-0 players who exhibit an individual-based bias). On the other hand, we do find evidence in line with the existence of level-1 column players and level-2 row players who anchor their beliefs in such level-0 behavior.[16] These types are more likely to choose their target strategies in the coordination games' extensions than in the base games, as we find in the data.

[14] Players might have various attitudes towards risk. If level-1 column players are extremely risk averse then they would choose the safe action in the base games as well as in the extensions. If they are risk neutral or risk seeking, they would choose the target on both occasions. In most applications of level-k models, it is assumed that players are risk neutral. While we do not examine players risk attitudes in our experiment, we think that it is reasonable to assume moderate risk aversion for the stakes involved in our games, and we show that this assumption allows to explain the qualitative differences between the base games and their extensions.

[15] As in single-equilibrium games, the hierarchy of types who anchor their belief on a level-0 column player behave similarly in base coordination games and their extensions.

[16] This finding is consistent with the assumption made in some applications of the level-k model, such as Costa-Gomes and Crawford (2006) and Crawford and Iriberri (2007) that level-0 exists only in the minds of higher types.

Table 14: Predictions of Adapted Level-k Model

	Coordination Games	Single-Equilibrium Games
Level-0 row	$p\_base_0^{CG} < p\_extension_0^{CG}$	$p\_base_0^{SG} < p\_extension_0^{SG}$
Level-1 column	$p\_base_1^{CG} < p\_extension_1^{CG}$	$p\_base_1^{SG} = p\_extension_1^{SG}$
Level-2 row	$p\_base_2^{CG} < p\_extension_2^{CG}$	$p\_base_2^{SG} = p\_extension_2^{SG}$
Level-3 column	$p\_base_3^{CG} < p\_extension_3^{CG}$	$p\_base_3^{SG} = p\_extension_3^{SG}$

Notes. Relationship between the choice frequency of the target in the extension and in the base game for the first three hierarchical levels, in coordination games (CG) and single-equilibrium games (SG). The notation $p\_base_k^i/p\_extension_k^i$ represents the frequency with which the target is chosen in base/extension games of type $i \in \{CG, SG\}$ for hierarchical type $k \in \{0, 1, 2, 3\}$.

5 Concluding Remarks

We design an experiment to test whether seemingly irrelevant strategies affect players' actions in a manner that violates the standard approach in game-theory. We find that dominated strategies and even more so duplicated strategies affect behavior in coordination games: they highlight one equilibrium over another and facilitate coordination. In single-equilibrium games, these strategies are indeed irrelevant. We use an adapted level-k model to explain the observed patterns.

Irrelevant strategies naturally appear in some real-life strategic situations, as in our opening bus line example. Furthermore, they may be intentionally added in strategic interactions by one of the players or by a third party. For example, in different types of negotiations, such as between firms' managements and employee unions, seemingly innocuous irrelevant strategies may affect the outcome of the deliberations in a manner that is highlighted in our work. This allows for sophisticated manipulation by parties if they consider adjusting the set of strategies they bring to the table. As another example, suppose that a CEO would like two of the company's departments, say HR and PR, to follow a certain policy that she is initiating across the board. On the other hand, she would also like to allow them some leeway in their choice of strategy. She may present them with 2-3 strategies and ask them to choose. Each combination of chosen strategies by the different departments are expected to lead to different outcomes that are known to the CEO. She may very well design the set of optional strategies in a manner that makes use of our findings to increase the probability of reaching her preferred outcome while maintaining the departments' heads ability to make an active choice of their own preferred strategy. Thus, seemingly irrelevant strategies should be taken into account by players, choice designers and even social planners. On the theoretical and predictive front, existing solution concepts of strategic interactions should be enriched in order to account for the relevance of irrelevant strategies.

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Appendix A: Payoff Matrices

For robustness purposes, for each game type we examined four different payoff matrices that slightly varied in their monetary payoffs and in the location of equilibria. The construction of the base games and their extensions followed a set of predetermined rules. Below we describe the main rules alongside a brief explanation of their underlying rationale. The payoff matrices appear in Tables A.1 and A.2.

1. Coordination base games are symmetric which allows for a swift understanding of the base game. The equilibrium payoffs on the other hand are asymmetric, i.e., (x, y) and (y, x) where $x \neq y$.

2. In the extended games, the added strategy generates the same payoff to the column player regardless of his own action. This reduces the potential for direct effects on the column players' behavior so that any effect on the column players is more likely to be a reaction to the expected change in the behavior of the row players due to the added strategy.

3. In the dominance extensions, the last digit of the row player's payoffs in the dominated strategy is different than the last digit of the other payoffs. In addition, the column player's payoff when the row player chooses the dominated option is 10 ILS lower than his lowest payoff in the base game. These features emphasize the domination relation and increase the likelihood that subjects will notice it.

4. In the compromise extensions, when the row player chooses the added strategy, the column player's payoff is equal to his lowest payoff in the base game.[17]

5. Payoffs are multiplications of 5 for clarity and simplicity.

[17] Due to a typographical error, in one of the compromise's extensions (game 3) the column player's payoff in the added strategy was slightly below his lowest payoff.

	Base		Dominance Extension		Duplicates Extension		Compromise Extension	
	40,40	**50,80**	40,40	**50,80**	40,40	**50,80**	10,30	**80,30**
Game 1	**80,50**	30,30	35,20	45,20	40,40	**50,80**	40,40	50,80
			80,50	30,30	**80,50**	30,30	**80,50**	30,30
	60,100	50,50	**60,100**	50,50	**60,100**	50,50	**80,40**	20,40
Game 2	40,40	**100,60**	55,30	45,30	**60,100**	50,50	60,100	50,50
			40,40	**100,60**	40,40	**100,60**	40,40	**100,60**
	75,105	65,65	**75,105**	65,65	**75,105**	65,65	**95,45**	25,45
Game 3	55,55	**105,75**	70,45	60,45	**75,105**	65,65	75,105	65,65
			55,55	**105,75**	55,55	**105,75**	55,55	**105,75**
	55,55	**65,95**	55,55	**65,95**	55,55	**65,95**	35,45	**85,45**
Game 4	**95,65**	45,45	50,35	60,35	55,55	**65,95**	55,55	65,95
			95,65	45,45	**95,65**	45,45	**95,65**	45,45

Table A.1: Payoffs of coordination base games alongside their extensions. In every base game the row player's strategies are Top and Bottom while in the extensions, they are Top, Middle and Bottom. The column player has two options – Left or Right. Equilibria in each game are in bold.

	Base		Dominance Extension		Duplicates Extension		Compromise Extension	
	40,40	**50,50**	40,40	**50,50**	40,40	**50,50**	20,40	**60,40**
Game 5	80,80	30,90	35,30	45,30	40,40	**50,50**	40,40	50,50
			80,80	30,90	80,80	30,90	80,80	30,90
	55,55	**65,65**	55,55	**65,65**	55,55	**65,65**	25,55	**85,55**
Game 6	85,85	45,95	50,45	60,45	55,55	**65,65**	55,55	65,65
			85,85	45,95	85,85	45,95	85,85	45,95
	45,45	35,35	**45,45**	35,35	**45,45**	35,35	**55,35**	15,35
Game 7	25,85	75,75	40,25	30,25	**45,45**	35,35	45,45	35,35
			25,85	75,75	25,85	75,75	25,85	75,75
	70,70	60,60	**70,70**	60,60	**70,70**	60,60	**90,60**	20,60
Game 8	50,100	90,90	65,50	55,50	**70,70**	60,60	70,70	60,60
			50,100	90,90	50,100	90,90	50,100	90,90

Table A.2: Payoffs of single-equilibrium base games alongside their extensions. In every base game the row player's strategies are Top and Bottom while in the extensions, they are Top, Middle and Bottom. The column player has two options – Left or Right. Equilibria in each game are in bold.

Appendix B: Instructions

Welcome to the experiment

You are about to participate in an interactive decision making experiment. Please follow the instructions carefully.

In the experiment you may earn a significant amount of money. For your participation you will receive 20 ILS. You may earn an additional substantial amount based on your decisions and the decisions of the other participants in this room.

During the experiment you will play 36 games. In each game you will be randomly matched with another participant as the opponent against whom you will play the game. The game will be presented on your screen and the interaction between you and your opponent will take place through the computer. The identity of your opponents will not be revealed to you during the experiment or after it is completed. In every game you may earn different sums of money depending on your choice and the choice of your opponent. **Upon completion of the experiment, the computer will randomly draw one of the 36 games you played and the amount of money that you earned in that game will be paid to you. Each participant may have a different game chosen for payment.** The choices of your opponent and payoffs will not be presented during the experiment but only upon its completion. Upon completion, you will learn your payoff in each game and which game was chosen for payoff.

Note that since nobody (not even the experimenters) know which game will be chosen for payment purposes, it is best for you to treat every game as if it is the one that counts. The total amount of earnings in the experiment (participation fee and the amount earned in the randomly drawn game) will be paid to you privately in cash immediately after the experiment is completed. We will move on to the payment stage only after all participants finish marking their choices in all games.

It is not allowed to talk during the experiment or to look at other participants' screens. If you have any questions please raise your hand and one of the experimenters will be happy to answer. In most games you will see a table of the following type:

	Left	Right
Up	50,40	10,20
Down	70,20	30,60

One of the participants will be considered the row player and the other participant will be considered the column player. In the game's instructions it will be mentioned if you are playing as the row player or the column player in that game.

The actions described in the rows are the actions that the row player can choose from. In the above table, these are Up and Down.

The actions described in the columns are the actions that the column player can choose from. In the above table, these are Left and Right.

Each player will be asked choose an action without knowing the other player's chosen action. In games in which you are the row player, another participant sees the same table and plays against you as the column player. When you are playing the role of the column player, another participant is playing against you as the row player.

The numbers in the cells of the table represent the ILS amount that each one of you will receive for any combination of your choices. In each cell, the payoff for the row player always appears on the left and the payoff to the column player always appears on the right.

For example, if the row player chose Up and the column player chose Left then the row player will receive a payoff of 50 ILS and the column player will receive a payoff of 40 ILS. If the row player chose Down and the column player chose Right then the row player will receive a payoff of 30 ILS and the column player will receive a payoff of 60 ILS.

In some games you will play the role of the row player and in some games you play the role of the column player.

In any game that you will play, regardless of your role, your payoffs will always be in blue while the payoffs of the other player will be in black. The purpose of the colors is simply to assist you in recognizing your own payoffs. Remember the rule: **Blue is mine, Black is the opponent's**.

A few games in the experiment will be described verbally and will not include a payoff table.

5 Training Games

In the first part of the experiment, you will play 5 training games to make sure that you understand the instructions. You will not receive payoffs for your choices in this training session. Following the training session, you will move on to the 36 games in which you may earn payoffs.