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Decomposed games, focal points, and the framing of collective and individual interests*

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Abstract

The literature attributes high coordination rates in pure coordination games with focal points to team reasoning and low coordination rates in related battle of the sexes games to level-*k* reasoning. We investigate whether coordination success changes in these games when they are decomposed in two component games. Among others, we decompose a pure coordination game into two battle of the sexes components and a battle of the sexes game in one pure coordination component and one battle of the sexes component. In line with narrow bracketing, we observe that the game decompositions are behaviourally relevant. We find that coordination success increases and decreases depending on the type of decomposition and order of component games.

Keywords: Decomposed games, focal points, narrow bracketing, framing, collective interest

JEL Codes: C72, C91, D90

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1 Introduction

Consider the battle of the sexes game (BS) between a Bach admirer and a Stravinsky enthusiast regarding the evening entertainment on 21 March 2022. “Their main concern is to go out together, but one person prefers Bach and the other person prefers Stravinsky” (Osborne and Rubinstein, 1994, p. 15). It is common knowledge that the evening happens to be on Bach’s 337th birthday, which makes the $\underline{\text{B}}$ach event salient. In experiments, such saliency enables high levels of coordination in pure coordination games (PC), however, its effectiveness is severely reduced in BS games.[1] In this paper, we ask whether the saliency-related coordination success of the two music devotees can be increased by emphasising their common interests, that is, the pure coordination element of the game “to go out together”? And, reversely, we ask whether coordination decreases when the common interest is de-emphasised in a PC game by splitting it into two BS games.

Table 1 shows one of many possible decompositions of a simple BS game into a pure coordination component (pc) and the remaining battle of the sexes component (bs), noted as $pc + bs$.[2] The pc component emphasises the common interests between players, whereas bs retains the feature of conflict of the simple BS game. Across component games, players have to choose identical strategies so that, theoretically, the two component games and the simple game are equivalent. This requirement of decomposed games is in contrast to independent games without such choice restrictions, which we also implement.

$$
\begin{array}{c|cc}
 & \underline{B} & S \\
\hline
\underline{B} & 11, 10 & 0, 0 \\
S & 0, 0 & 10, 11
\end{array}
\;=\;
\begin{array}{c|cc}
 & \underline{B} & S \\
\hline
\underline{B} & 4, 4 & 0, 0 \\
S & 0, 0 & 4, 4
\end{array}
\;+\;
\begin{array}{c|cc}
 & \underline{B} & S \\
\hline
\underline{B} & 7, 6 & 0, 0 \\
S & 0, 0 & 6, 7
\end{array}
$$

Table 1: Decomposition of BS game into $pc + bs$. Salient strategy $\underline{B}$.

In this paper, we ask whether individual behaviour changes across simple games and decomposed ones. Is the game play influenced by the nature of the first or second component game rather than the original simple game? Would it matter that the second component is only visible after a provisional choice in the first? Furthermore, given that the decomposition is not unique, does the size of the separated pc payoff influence the success of coordination?

Like lottery choices give rise to narrow bracketing, decomposing a game gives rise to the possibility that players narrow bracket and consider component games in isolation, failing to see the decomposed game as a whole (Read, Loewenstein, Rabin, Keren and Laibson, 1999; Tversky

[1]Experimental evidence shows that in pure coordination games payoff-irrelevant salient features allow players to coordinate with a success rate higher than predicted by random choice (Mehta et al., 1994; Bardsley et al., 2010). This literature has furthermore established that this success is severely reduced in battle of the sexes games due to the players’ conflicts of interest (Crawford et al., 2008; Isoni et al., 2013; Sitzia and Zheng, 2019; van Elten and Penczynski, 2020; Isoni et al., 2020).

[2]Henceforth we will indicate component games with lowercase letters and simple games with uppercase letters.

and Kahneman, 1981; Rabin and Weizsäcker, 2009). Considering the components in isolation does not necessarily mean that player's choices across the components are not related. Behavioural spillovers could emerge between the components, such that the adoption of one behaviour causes another related behaviour (Bednar et al., 2012).

Analogous to lottery choices, we find narrow bracketing in strategy choices in decomposed games. Coordination success in decomposed *BS* games increases if a *pc* component game is presented first and decreases when the first game is a *bs*. Furthermore, we see interesting asymmetric spillover patterns in that the strategy chosen in a first component is more likely to influence the strategy chosen in the decomposed game if the first component is a *bs* than if it is a *pc*. This is similar to independent games, where we observe that a *bs* component game reduces the coordination success in the subsequent *pc* component game while a *pc* component does not increase coordination success in the subsequent *bs* component game.

In an even starker example of narrow bracketing, decomposing a simple *PC* game into two *bs* components reduces coordination success significantly. This result shows clearly that players do not integrate the component games to recover the original *PC* game.

The game decompositions in our study illustrate how games can be framed in different ways by separating and thus emphasising different elements of the overall strategic situation. Our results show that this, in turn, can lead to significantly different player behaviour. The concepts of narrow bracketing and spillovers seem highly relevant to guide our expectations of the consequences of different game decompositions. Therefore, we believe that decompositions of games in experiments have great potential for investigating framing effects in games and will likely find a new application in game theory beyond the theoretical and diagnostic purposes they have served so far in the literature (Candogan et al., 2011; Kalai and Kalai, 2013; Jessie and Saari, 2019; Demuynck et al., 2019).

2 Literature

2.1 Coordination games with focal points and modes of reasoning

Coordination games present a problematic class of games for standard game theory because of its inability to select one equilibrium out of many. In his seminal work, Schelling (1960) proposes a theory of focal points in which players are able to concert their expectations on some salient features of the game (e.g. salient labels attached to strategies) and coordinate on one particular equilibrium, the focal point of the game. Schelling's theory has been further developed by Sugden (1993) and Bacharach (2006) under the name of team reasoning. These theories assume that players think of themselves as being part of a team (collective rationality). In Bacharach's theory, when players team-reason they ask the question "what should we do" and work out a strategy profile, the best rule in Sugden's theory, that leads to the best possible outcome for the team and dictates what each player should do.

Using a variety of pure coordination games, abundant experimental evidence consistent with team reasoning has been collected over the years. For example, Mehta et al. (1994) employ a series of matching games in which subjects are asked to name an object (flower, city, etc.) or to choose an object out of many. Crawford et al. (2008) find similar results employing a pie game and an allocation XY-game. The pie game is a two-player game with three pure Nash equilibria while the allocation game features two. Isoni et al. (2013) use a bargaining table in which players have to agree on how to share a monetary surplus by making claims on some valuable "discs".

The promising success of team reasoning theories in explaining behaviour in pure coordination games however is greatly reduced when players' interests are not aligned, such as in the battle of the sexes games. Crawford et al. (2008) develop a model of level-k thinking that is able to explain the low coordination success observed in these games. This type of reasoning is fundamentally different and incompatible with team-reasoning, as it implies an individualistic type of reasoning in which players anchor their beliefs on the behaviour of a player that lacks strategic sophistication, a level-0 player, and best respond to that.

Since Crawford et al. (2008), attempts have failed to show that team reasoning is the prevalent mode of reasoning employed across the whole range of coordination games (e.g. Bardsley et al., 2010; Isoni et al., 2013; Faillo et al., 2017). Empirical evidence shows that individuals seem to be using both types of reasoning depending on the features of the coordination games. Specifically, conflicts of interest seem to inhibit team-reasoning and evoke individualistic reasoning while absence of conflict facilitate collective reasoning (Faillo et al., 2017; van Elten and Penczynski, 2020)

Decomposed games provide insights that are indicative of the extent to which modes of reasoning can be influenced and of whether one of the two modes of reasoning is more fragile.

2.2 Narrow bracketing and behavioural spillovers

When facing multiple choices at the same time, individuals often consider each choice in isolation and fail to appreciate the consequences of those choices collectively. Narrow bracketing is a well-documented phenomenon in the literature of individual decision-making under risk (Read et al., 1999). A clear instance is offered in the study by Tversky and Kahneman (1981), later replicated by Rabin and Weizsäcker (2009). Specifically, from choices between lotteries A and B as well as C and D, only 3 percent choose combination BC. Yet, the majority chooses BC over AD when these lottery pairs are presented in aggregate.

Bland (2019) finds evidence of narrow bracketing at the individual but not at the aggregate level when two Volunteer's dilemmata are played simultaneously. Our study, although not designed as a controlled test of narrow bracketing, adds clear evidence of this phenomenon in decomposed games. Most apparently, in a $bs + bs$ decomposition of a PC game, the lower coordination success than in the PC game suggests that subjects do not integrate outcomes fully.

While the concept of narrow bracketing focuses on the differences between the game and its decomposed equivalents, the concept of behavioural spillovers considers changes in behaviour in a game due to games played beforehand or simultaneously.

In an ensemble of games, behavioural spillovers might be the result of a positive transfer of a principle, rule or strategic behaviour from one game to another one (Knez and Camerer, 2000; Cooper and Kagel, 2005, 2008; Haruvy and Stahl, 2012; Mengel and Sciubba, 2014). For example, Cooper and Van Huyck (2018) provide experimental evidence of a transfer of the principle of dominance from stag-hunt games to order statistic games such as the weak-link or median games. In the absence of feedback, our study provides an example of asymmetric "rule spillover". Our results are in line with the explanation that the mode of strategic reasoning is carried over from *bs* to *pc* components, but not vice versa.

Inefficient spillovers with negative effects have been of particular concern (Bednar et al., 2012; Liu et al., 2019). For example, defection is observed more frequently when the Prisoner's Dilemma is played with a Self-Interest game than when it is played in isolation. This literature predominantly observes spillovers from games with clearly favoured actions to games with more distributed action profiles (Cason et al., 2012). Here, we see the opposite, as the spillover is most pronounced when moving from the low coordination *bs* components to the high coordination *pc* components. This suggests that an individual type of reasoning is more persistent that a collective one.

Playing an ensemble of games might also give rise to a form of decision inertia, in which a decision made in a game is mechanically applied to a subsequent game without engaging with a strategic decision process. This decision inertia is conceptually different from behavioural spillovers and closer to a kind of status quo bias or default bias (Samuelson and Zeckhauser, 1988; Fernandez and Rodrik, 1991).

Once a decomposition is implemented, the presentation order of the component games has to be inevitably defined. This way, permutations of a given decomposition might lead to different behaviour. In psychology, order effects such as primacy and recency effects have been studied with respect to elementary cognitive operations such as recall and belief updating that influence decision-making (Murdock, 1962; Hogarth and Einhorn, 1992).

3 Experimental design and procedures

3.1 The games

We employ a set of simple games inspired by the XY-game in Crawford et al. (2008). In these games, two players are required to choose one out of two strategies. In the games we employed, strategies are labelled by the resulting payoff allocation in the case of coordination. One of the strategies is made salient by underlining it. If players choose the same strategy then the allocation is enforced, otherwise they earn nothing. The two choices are presented as follows.

- <u>You receive £a and the other receives £b</u>
- You receive £b and the other receives £a

In a pilot experiment, underlining one of the strategies has proved to be a more powerful cue for coordination than using X and Y. We implemented one simple PC game, in which $a = b$, and two simple BS games, in which $a > b$. The payoff matrices for these games are reported in table 2. In line with the experiment's framing, the strategies have been labelled as $\underline{A}$ and A.

	$\underline{A}$	A
$\underline{A}$	10, 10	0, 0
A	0, 0	10, 10

(a) PC (10, 10).

	$\underline{A}$	A
$\underline{A}$	11, 10	0, 0
A	0, 0	10, 11

(b) BS (11, 10)

	$\underline{A}$	A
$\underline{A}$	12, 9	0, 0
A	0, 0	9, 12

(c) BS (12, 9)

Table 2: Implemented simple games.

$$\begin{array}{c|cc} & \underline{A} & A \\ \hline \underline{A} & 10, 10 & 0, 0 \\ A & 0, 0 & 10, 10 \end{array} = \begin{array}{c|cc} & \underline{A} & A \\ \hline \underline{A} & 7, 6 & 0, 0 \\ A & 0, 0 & 6, 7 \end{array} + \begin{array}{c|cc} & \underline{A} & A \\ \hline \underline{A} & 3, 4 & 0, 0 \\ A & 0, 0 & 4, 3 \end{array}$$

(a) Decomposing of PC into a bs+bs.

$$\begin{array}{c|cc} & \underline{A} & A \\ \hline \underline{A} & 11, 10 & 0, 0 \\ A & 0, 0 & 10, 11 \end{array} = \begin{array}{c|cc} & \underline{A} & A \\ \hline \underline{A} & 7, 6 & 0, 0 \\ A & 0, 0 & 6, 7 \end{array} + \begin{array}{c|cc} & \underline{A} & A \\ \hline \underline{A} & 4, 4 & 0, 0 \\ A & 0, 0 & 4, 4 \end{array}$$

(b) Decomposing of BS into a bs+pc.

Table 3: Simple games and examples of how they can be decomposed.

In addition to the simple games, we implement 27 decomposed games obtained by separating the payoffs of the simple games into two components, component 1 and component 2. The simple

PC game is decomposed either into two *PC* games ($pc + pc$) or two *BS* games ($bs + bs$) (see table 3a). The simple *BS* games are decomposed into one *pc* game and one *bs* game (see table 3b). Table 4 lists all simple and decomposed games that we employed.[3]

When facing a decomposed game, a player must choose the same strategy in both components. This guarantees that a simple game and any decomposed games derived from it are theoretically equivalent.

For each simple game and any combination of component games (e.g. $pc + bs$) there are at least four games featuring different payoffs. This range enables us to verify whether the size of the *pc* payoffs matter. This range also prevents any inference over time about the simple game from the first component game, a feature whose relevance will be clear below.

Simple Game	Decomposed Games				Simple Game
	$pc + pc$	$bs + bs$	$pc + bs$	$bs + pc$	
	0, 0 + 10, 10	1, 0 + 9, 10	0, 0 + 11, 10	11, 10 + 0, 0	
	4, 4 + 6, 6	3, 0 + 7, 10	4, 4 + 7, 6	7, 6 + 4, 4	$BS(11, 10)$
	7, 7 + 3, 3	4, 3 + 6, 7	7, 7 + 4, 3	4, 3 + 7, 7	
$PC(10, 10)$	9, 9 + 1, 1	5, 2 + 5, 8	10, 10 + 1, 0	1, 0 + 10, 10	
	10, 10 + 0, 0	7, 5 + 3, 5	0, 0 + 12, 9	12, 9 + 0, 0	
		7, 6 + 3, 4	4, 4 + 7, 5	7, 5 + 4, 4	$BS(12, 9)$
			7, 7 + 5, 2	5, 2 + 7, 7	
			9, 9 + 3, 0	3, 0 + 9, 9	

Notes: The games $pc(0, 0)$ and $bs(1, 0)$ have different equilibrium features than standard *pc* and *bs* games, respectively.

Table 4: Implemented simple and decomposed games (outcomes of the equilibrium $\underline{AA}$ in each component game reported).

3.2 The experiments

We have run two experiments, *PARALLEL* and *SERIAL*.[4]

In *PARALLEL*, we implement simple and decomposed games. In this experiment, the component games are presented on the screen at the same time (see figure 1). Component 1 is always displayed at the top of the screen and component 2 at the bottom.

[3]Due to a typo, instead of $(4, 4 + 8, 5)$ our experiment implemented $(4, 4 + 7, 5)$. Since behaviour in these games is not significantly different from other decomposed games of the $BS(12, 9)$ game, we expect that this would have been true for $(4, 4 + 8, 5)$ as well.

[4]The names refer to the simultaneous and sequential transmission of multiple pieces of information, called parallel and serial, respectively. All games are "simultaneous games" in terms of game theory. It is therefore useful to introduce different adjectives for this mode of framing.

In *SERIAL*, the framing of decomposed games is strengthened by presenting the component games on the screen one after the other and by requiring a decision in component 1 to be made before component 2 is shown (see figure 2).

In decomposed games, when component 2 is displayed, subjects still need to actively select their preferred strategy. If the strategies selected in both components differ, subjects cannot proceed to the next task until they select the same strategy in both components. This feature of the design was implemented to minimise decision inertia in component 2, and thus in the decomposed game as a whole.

SERIAL also implements a third class of game that we call unlinked games. These games feature the same component games as decomposed games, however, they can be played independently and thus allow players to choose different strategies between components.

This setup aims to make the manipulation of the decomposition very strong. When facing a component 1, players do not know whether that is the component 1 of a decomposed game, the component 1 of an unlinked game, or all of a simple game. They have to make a choice to proceed and it might be payoff-relevant. Of course, the uncertainty realises after they selected a strategy and in a decomposed game players are allowed to change the strategy they have selected in component 1. In other words, the decision in all decomposed games in *SERIAL* is made when both components are visible and thus after a decision has been made on component 1 alone.

Thanks to the unlinked games, even over time, subjects cannot guess the payoffs of the second component just by knowing what the first component payoffs are, because each first component game features in several games.[5]

[5] In order to identify games in the experiment, the instructions employ a simpler terminology: "linked" allocations for decomposed games, "unlinked" allocations for unlinked games, and "allocations" for simple games. Instructions are reprinted in appendix A.

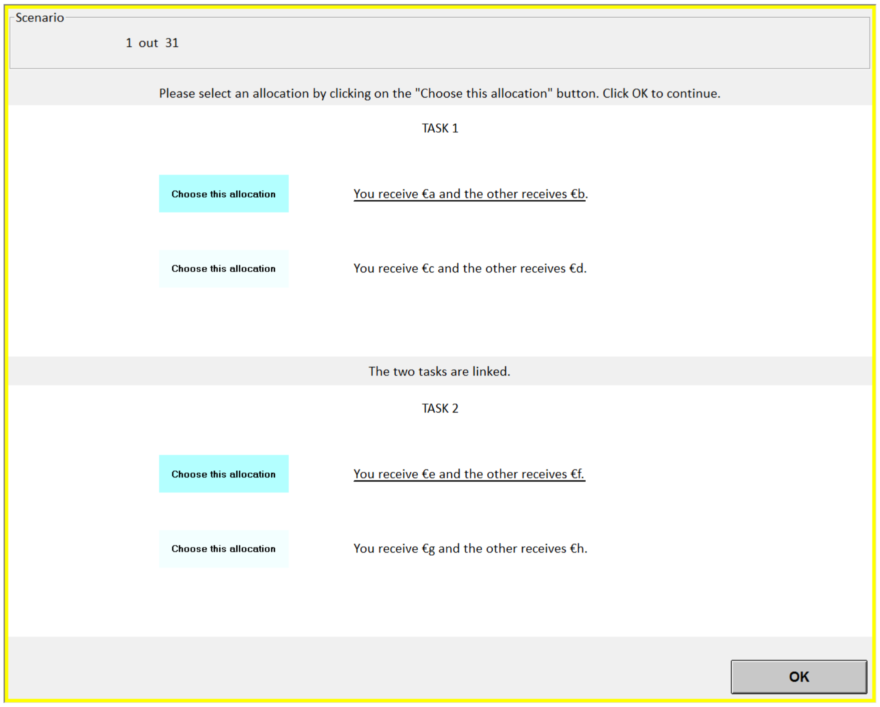
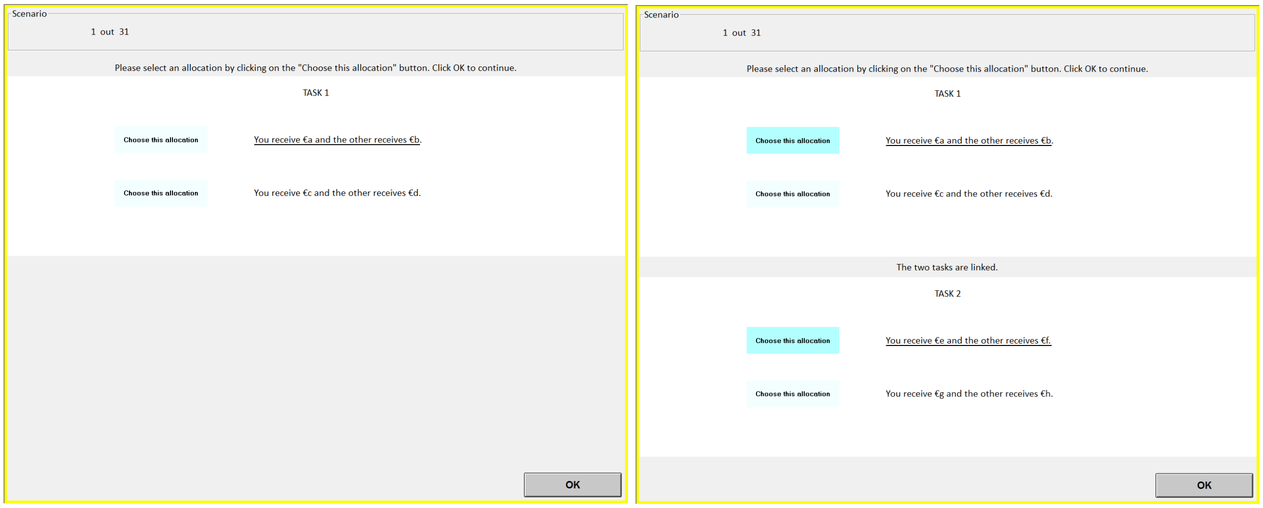


Figure 1: Screenshot of compound game in experiment *PARALLEL*.

In order to have a similar number of games in both experiments, *SERIAL* features two types of sessions: SER_a and SER_b. Each type features only half of the decomposed games in *PARALLEL* with the remaining half implemented as unlinked games. The decomposed games in SER_a are implemented as unlinked games in SER_b, and vice versa. Decomposed games are chosen so that both SER_a and SER_b feature an equally numerous representation of $pc + pc$, $bs + bs$, $pc + bs$, and $bs + pc$ for each simple game employed. Simple games are implemented in both types of sessions.



(a) Screen 1 with component 1.

(b) Screen 2 with components 1 and 2.

Figure 2: Screenshots of decomposed games in *SERIAL*.

3.3 Procedures

The experiments were run in the AWI laboratory at the University of Heidelberg (Germany) in July 2018. We recruited 148 subjects with the online system hRoot (Brock 2004): 46 subjects in *PARALLEL* and 102 subjects in SER_a or SER_b sessions. Upon arrival, subjects were handed the experimental instructions that were read aloud by the experimenter. Subjects then answered a brief questionnaire to check their understanding of the experiment. When all participants were ready the experiment started. The order of the games was randomised across participants. Feedback was only provided at the end for one randomly selected game that was then used to determine the experimental earnings. In addition, subjects were given a participation fee of €5. Average earnings were about €10.38.

4 Hypotheses

The literature's results about the quite distinct reasoning generated by pure coordination games and battle of the sexes games motivates our decompositions. In this section, we will therefore derive detailed hypotheses for our games using a combination of team reasoning (Bacharach, 2006; Schelling, 1960; Sugden, 1995) and level-k thinking (Crawford et al., 2008). Following Isoni et al. (2019), we will assume that players are capable of using both modes of reasoning, although only one at a time.

The simple games feature two players $i = \{1, 2\}$ and two strategies $s = \{\underline{A}, A\}$. Strategies are uniquely labelled with one label per strategy, one of which is salient ($\underline{A}$). By virtue of this labelling, one strategy stands out. If players choose the same strategy, which is equivalent to choosing the same label, their payoffs are $\pi_{is} \in \{a, b\}$ (with $a \geq b > 0$) and zero otherwise. The simple games are used to derive decomposed and unlinked games. These games consist of two component games $c = \{1, 2\}$, each with two strategies $s(c) \in \{\underline{A}, A\}$. In decomposed games, players are required to choose the same strategy in both component games. In unlinked games, players are not constrained in their strategy choice. If two distinct decomposed games are derived from the same simple game we say that they reduce to the same simple game.

We say that two players team-reason if they independently look for a uniquely optimal rule which, if followed by both players, maximises the chances of coordination leading to the best possible outcome for the team. In coordination games in which labels are common knowledge the best rule for the team is to choose the label salient strategy, i.e. $s = \underline{A}$.

The version of the level-k model in Crawford et al. (2008) assumes that players differ in their level of strategic sophistication. Level-0 players ($L0$) have a payoff bias, in that they choose, with a probability $p > 0.5$, the strategies whose equilibria have a higher own-payoff. If both equilibria have the same own-payoff, $L0$ choose according to label salience with probability $p > 0.5$. Higher levels anchor their beliefs on the behaviour of $L0$ and best-respond to players just one level below theirs. $L1$ best-respond to $L0$, $L2$ to $L1$ and so on. The distribution of levels in the population is exogenously given and $L0$ only exist in the mind of other players. $L1$ in a PC will therefore always choose the label salient strategy $s = \underline{A}$, as the probability of coordination is greater than one half. All levels greater than $L1$ will best-respond by choosing the same strategy. In BS games, how often the label salient strategy is chosen depends on the distribution of levels. For our purposes, without making any further assumption, it suffices to say that $s = \underline{A}$ will be chosen less frequently than in a PC game.

Following Isoni et al. (2019), let us define the probability that a player uses team-reasoning as τ. The probability that a player uses level-k reasoning is $\kappa = 1 - \tau$. If we consider the whole population of players, this probability can be interpreted as a proportion.

We assume that the class of games (i.e. pure coordination or battle of the sexes games) determines these probabilities irrespective of the game being a simple or a component game. For a PC game, where $a = b$, experimental evidence suggests that team reasoning is more prevalent than level-k reasoning, therefore $\tau_{PC} > \kappa_{PC}$. By contrast, level-k thinking is more prevalent in BS games, therefore $\kappa_{BS} > \tau_{BS}$ (van Elten and Penczynski, 2020). We take this to further imply that $\tau_{PC} > \tau_{BS}$.

Hypothesis 1 (Simple games)**.** *The frequency of choice of the salient strategies is greater in the simple PC than in the simple BS games.*

We will derive predictions for the reasoning in decomposed games with the help of three assumptions, two specifying the determinants of the mode of reasoning and one specifying exactly which game is reasoned about.

Assumption 1 (Narrow bracketing)**.** *In decomposed games, components are evaluated separately.*

The first assumption is that players do not integrate the component payoffs. They think of each component individually. The probability of reasoning is determined by the type of component. In a *pc* component players are more likely to team-reason, in a *bs* component they are more likely to use level-*k*.

Assumption 2 (Component game payoffs)**.** *For any two decomposed games, derived from the same simple game and with the same ordered classes of component games, different payoffs in the component games do not have any effect on the mode of reasoning.*

While one might expect that an increase in the *pc* payoffs increases coordination, such an increase also changes the relative difference between the *bs* payoffs in our decomposition.[6] The overall effect is therefore not clear and we assume for simplicity no effect of differently sliced decompositions. Thus, for example, any decomposed game that combines component games of classes *bs* and *pc* in the same order and that reduces to a $BS(11, 10)$ game – be it $(7, 6 + 4, 4)$ or $(1, 0 + 10, 10)$ – leads to the same expectations on the modes of reasoning. Our experiment is however designed to be able to falsify this assumption.

Assumption 3 (The pivotal component)**.** *The probability that the strategy selected in the decomposed game is that selected in component 1 is* $0.5 < p_{PARALLEL} < p_{SERIAL}$.

Because in a decomposed game the same strategy must be chosen in both components, we need a selection rule that picks out the component that determines which strategy is chosen in the decomposed game. The pivotal component determines the direction of behavioural spillovers, which we assume are more likely to happen from component 1 to component 2 rather than vice versa, as component 1 is always displayed at the top of screen, and likely to be seen first. Compared to *PARALLEL*, experiment *SERIAL* can be seen as a manipulation that prompts a stronger narrow bracketing effect by displaying the component games one by one. Hence the higher *p*.

On the basis of these assumptions, the next two hypotheses spell out the most basic implications of decomposing simple games for behaviour.

Hypothesis 2 (*PC* decomposition)**.** *Decomposing a PC game into pc + pc does not lead to a change in the frequency of choice of the salient strategy. Decomposing a PC game into bs + bs leads to a decrease in the frequency of choice of the salient strategy.*

[6] Parravano and Poulsen (2015) show that an increase in the *PC* payoffs leads to an increase in coordination while a proportional increase in the payoffs of a *BS* game does not lead to a significant change in behaviour. Our hypothesis cannot be drawn from their findings, since the payoffs change in *pc* leads to a change in the relative payoff difference of the equilibrium outcomes in the remaining *bs*.

As in $bs + bs$ both components are battle of the sexes, the probability that players use level-k reasoning is greater than in PC.

Hypothesis 3 (*BS* decomposition)**.** *Decomposing a BS game into bs + pc or pc + bs increases the frequency of choice of the salient strategy. The effect is stronger in SERIAL than in PARALLEL.*

Because the first component game is assumed to be more important for the mode of reasoning, a *pc* component 1 leads to more frequent team reasoning and salient choices. A *bs* component 1 leads to more level-k reasoning. However, even with a lower probability, the *pc* component 2 can still influence modes of reasoning. For this reason, we expect the frequency of salient strategy choices to be greater than in the simple BS. In $SERIAL$ the effect is more pronounced than in $PARALLEL$, as a *bs* component 1 is assumed to have a stronger effect on the modes of reasoning.

Hypothesis 3a (BS order)**.** *Decomposing a BS game into a bs + pc leads to a lower frequency of choice of the salient strategy than a pc + bs decomposition. The effect is stronger in SERIAL than in PARALLEL.*

Compared to $pc + bs$, the *bs* component 1 in $bs + pc$ makes team reasoning and thus salient choices less frequent.

5 Results

In a battle of the sexes game, whether a simple or a decomposed one, we define player 1 ($P1$) as the player whose payoff is higher in the focal point equilibrium and player 2 ($P2$) as the other player. For the $bs + bs$ decomposed game, we let component 1 define $P1$. It follows that $P1$ has the lower own-payoff in the focal point equilibrium in the second *bs* component game. The reverse is true for $P2$. We use the same definitions of players in the unlinked games.

5.1 The simple games

Table 5 shows that the choice frequency of the salient strategy is, as expected, significantly greater in the PC game than in both BS games (McNemar test, on pooled $PARALLEL$ and $SERIAL$ data; $p < 0.001$ for PC vs. $BS(11, 10)$, $p < 0.001$ for PC vs. $BS(12, 9)$). In the simple BS games, both players choose less often the salient strategy, but the reduction is more pronounced for $P2$.

Result 1 (Simple Games)**.** *The choice frequency of the salient strategy is greater in PC than in the two BS games.*

Experiment	Players	*PC*	*BS* (11, 10)	*BS* (12, 9)
PARALLEL	*All*	0.826	0.630	0.478
	*P*1	–	0.696	0.522
	*P*2	–	0.565	0.435
SERIAL	*All*	0.843	0.608	0.647
	*P*1	–	0.706	0.765
	*P*2	–	0.510	0.529

Table 5: Fractions of salient strategy choices in the simple games *PC* and *BS* by experiment and player type.

5.2 Component game payoff size

In the derivation of the hypotheses, assumption 2 states that behaviour in decomposed games is not influenced by the specific payoff size of each individual component. This assumption is directly testable in our experiment, which features up to four different payoff decompositions per *BS* game. As the assumption on payoff size is only critical in deriving the hypotheses in decomposed games with both *pc* and *bs* components, we restrict our analysis to *BS* decompositions.

	PARALLEL			*SERIAL*		
	All	*P*1	*P*2	*All*	*P*1	*P*2
pc payoff	0.031	0.041^{*}	0.021	-0.027^{*}	−0.024	−0.031
	(0.022)	(0.023)	(0.027)	(0.015)	(0.019)	(0.019)
Period	0.003	0.006^{*}	0.001	0.000	0.000	−0.001
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
bs + *pc*	−0.021	−0.015	−0.028	-0.118^{***}	−0.020	-0.215^{***}
	(0.022)	(0.028)	(0.026)	(0.032)	(0.045)	(0.043)
BS (12, 9)	−0.004	0.041	−0.049	0.039	0.069	0.010
	(0.024)	(0.041)	(0.030)	(0.053)	(0.054)	(0.070)
N	736	368	368	816	408	408

Notes: Logit regression with standard errors clustered at the subject level. The variable *pc* payoff is categorised as follows: 1 = $(0, 0)$; 2 = $(4, 4)$, 3 = $(7, 7)$, 4 = $(10, 10)$ or $(9, 9)$. Significance levels: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. *N*: Number of observations.

Table 6: The effect of the size of the *pc* payoffs on fractions of salient strategy choices.

Table 6 reports the results of a logit regression with clusters at the subject level. The dependent variable is a binary variable that takes value one if the salient strategy is chosen and zero otherwise. The independent variables are the size of the *pc* payoffs ("*pc* payoff"), "Period", "*bs* + *pc*" which takes value one if *bs* is either placed at the top of the screen in *PARALLEL* or displayed first in *SERIAL* and zero otherwise, "$BS(12, 9)$" which takes value one if the decomposed game reduces to the simple *BS* with payoffs (12,9) in the focal equilibrium and zero otherwise.

We estimate six models: three per experiment. "*All*" considers all the experiment's data, "$P1$" and "$P2$" only player 1 and player 2's data, respectively. The estimated coefficient of "*pc* payoff" is positive and marginally significant in *PARALLEL* for $P1$ and negative and marginally significant in *SERIAL* for *All*. The order of the components is relevant in *SERIAL*, and affects significantly only the behaviour of $P2$; the next section will come back to this result. "Period" of play is weakly significant in *PARALLEL* for $P1$. Overall, these results do not show a systematic influence of the *pc* payoff size and are thus supportive of our modelling assumption 2.

5.3 The decomposed games

Table 7 reports the proportion of salient strategy choices for all decomposed game types by experiment and player type. Because our main concern is whether behaviour differs across these four decomposed game types, we focus on averages without distinguishing whether they reduce to the simple $BS(12, 9)$ or to the simple $BS(11, 10)$.

		PC		*BS*		Simple *BS*
Experiment	Players	$pc + pc$	$bs + bs$	$bs + pc$	$pc + bs$	Average
PARALLEL	*All*	0.865	0.743	0.598	0.614	0.554
	$P1$	–	0.783	0.723	0.728	0.609
	$P2$	–	0.703	0.473	0.500	0.500
SERIAL	*All*	0.843	0.634	0.581	0.699	0.627
	$P1$	–	0.778	0.730	0.750	0.735
	$P2$	–	0.490	0.431	0.647	0.520

Notes: The column "Simple *BS* Average" shows the average fraction of salient strategy choices in $BS(11, 10)$ and $BS(12, 9)$. In a *BS* game, $P1$ is the player whose payoff is higher in the focal point. In $bs + bs$, $P1$ is identified in component 1.

Table 7: Fractions of label salient choices in the decomposed games by experiment and player type.

PC Decomposition. We expect behaviour in $pc + pc$ and simple *PC* to be similar, but $bs + bs$ to be different, since narrow bracketing suggests that modes of reasoning are triggered by the *bs* component. We find evidence in support of this hypothesis in both experiments (Wilcoxon signed-rank test, *PC* vs $pc + pc$: $p = 0.783$ in *PARALLEL* and $p = 0.601$ in *SERIAL*; *PC* vs $bs + bs$:

$p = 0.064$ in *PARALLEL* and $p < 0.001$ in *SERIAL*))[7].

Result 2 (*PC* decomposition)**.** *In both PARALLEL and SERIAL, the choice frequency of the salient strategy is significantly lower in $bs + bs$ than in PC.*

This result suggests that players do not fully integrate outcomes, which is in line with narrow bracketing. In *PARALLEL* however, the fact that the frequency of salient strategy choices in $bs+bs$ is significantly greater than in *BS* ($p = 0.002$ in *PARALLEL*), suggests that something akin to partial integration is occurring. In *SERIAL*, on the other hand, the sequential display seems to induce much less integration ($p = 0.181$ in *SERIAL*). It might be argued that this can be explained by decision inertia, in that subjects stick to the decision they have made in component 1 once component 2 is displayed, without engaging with the second component. We do not think this is plausible, as subjects cannot proceed to the next task without selecting a strategy in the second component. Later on, we will provide more evidence that is not consistent with this explanation.

Note that the lower frequency of salient strategy choices in $bs + bs$ compared to that in the simple *PC* is mainly influenced by the behaviour of $P2$ and to a lesser extent by that of $P1$. This is consistent with the assumption that component 1 has a stronger effect on behaviour than component 2 in both experiments but especially in *SERIAL*. Because $P2s$ have a lower own-payoff in the focal point of component 1, they choose the salient strategy less often than the non-salient one. Specifically, in *SERIAL*, the salient strategy is chosen 49% of the times and this selection is changed in the second bs only about 12% of the times, even when it becomes apparent that the decomposed game reduces to a simple *PC*. This type of behaviour is compatible with some kind of decision inertia, but it is also possible that once players are distracted by the conflict of interest in the first bs, attention to label salience is lost when the second bs is unveiled. This result is consistent with narrow bracketing.

BS Decomposition. Table 7 shows that in *PARALLEL* the mere decomposition of a *BS* into a decomposed game featuring a pc component does lead to an increase, albeit not significant, in the choice frequency of the salient strategy compared to the simple *BS* ($p = 0.305$ for $bs + pc$ vs. *BS*, and $p = 0.191$ for $pc + bs$ vs. *BS*). In *SERIAL*, only in $pc + bs$, subjects choose this strategy more frequently than in *BS* ($p = 0.014$). In the $bs + pc$ decomposition this strategy is, in fact, chosen less often ($p = 0.055$).

Result 3 (*BS* Decomposition)**.** *In PARALLEL, the BS decomposition does not have a significant effect on the frequency of salient strategy choices compared to a simple BS. In SERIAL instead, we do find that this frequency increases in the $pc + bs$ decomposition and decreases in the $bs + pc$ one.*

[7]Here and after, unless otherwise stated, all within-subject tests are Wilcoxon signed-rank tests.

The *BS* decomposition in *PARALLEL* does not have the hypothesised significant effect of highlighting the common interests in coordination via the *pc* component. For this decomposition to be effective, *SERIAL*'s stronger emphasis of the component 1 is needed. An implication of this finding, consistent with the literature on focal points, is that the mere information, as in *PARALLEL*, on the presence of a *bs* component influences behaviour more than the knowledge of the presence of a *pc* component. In *SERIAL*'s $pc + bs$, subjects' stronger exposition to the *pc* component makes their behaviour more in line with simple *PC* games.

BS Order. Hypothesis 4 states that, the order in which component games are presented, influences how often the salient strategy is chosen. We do find that this is indeed the case in both experiments, but the effect is statistically significant only in *SERIAL* ($pc+bs$ vs. $bs+pc$, $p = 0.694$ in *PARALLEL* and $p < 0.001$ in *SERIAL*).

Result 4 (*BS* Order)**.** *In SERIAL, decomposing a BS game into bs + pc leads to a lower choice frequency of salient strategy than it does in pc + bs. No difference is observed in PARALLEL.*

The difference in salient strategy choices between $bs + pc$ and $pc + bs$ is mainly driven by the behaviour of subjects in the role of $P2$. $P2$s choose the salient strategy only 43% of the times when the *bs* component is played before the *pc* one. Instead, they choose it significantly more when *bs* is displayed afterwards ($pc + bs$ vs. $bs + pc$, $p = 0.539$ for $P1$, $p < 0.001$ for $P2$).

5.4 First component game analysis

Some further insights into the reasoning process in decomposed games can be gained from the first component game choices in experiment *SERIAL*. Table 8 reports the proportion of decomposed game choices that differ from the first component choice. This information illustrates the circumstances under which subjects switch their strategy between the first component game and the overall decomposed game.

Three regularities are noteworthy. First, there is – as expected – little switching in the $pc + pc$ decomposition. Second, decomposed games with a first *bs* component game feature low levels of switching. The analysis by player shows that the predominant direction of switches differs between players. This therefore illustrates why the coordination success is low in these decomposed games. Given that the player identities derive from the *bs* component game, this is the likely source of miscoordination. Finally, the last column shows high levels of switches in the $pc + bs$ game to the non-salient strategy. Out of all players choosing the non-salient strategy in this decomposed game, 59.3% did so by switching away from the salient strategy in the first *pc* component game. These large differences in switching across different games are not supportive of a decision inertia that leads to a lack of engagement with component 2. Overall, switches are in the direction of the non-salient strategy to such an extent that the choice distributions between component 1 and

Strategy switch	Players	*PC*		*BS*	
Component 1 → Decomposed game		*pc* + *pc*	*bs* + *bs*	*bs* + *pc*	*pc* + *bs*
Non-salient → Salient	*All*	0.023	0.134	0.059	0.081
	*P*1	–	0.034	0.020	0.085
	*P*2	–	0.293	0.125	0.076
Salient → Non-salient	*All*	0.021	0.098	0.076	0.593
	*P*1	–	0.294	0.200	0.392
	*P*2	–	0.013	0.017	0.736

Notes: In a *BS* game, *P*1 is the player whose payoff is higher in the focal point. In *bs* + *bs*, *P*1 is identified in component 1.

Table 8: Proportion of strategy switches out of all choices of the indicated decomposed game strategy.

decomposed game are significantly different ($p < 0.001$). This evidence testifies to the fragility of salience as a choice driver once misaligned interests appear in the *bs* component 2. As expected, this tendency is most pronounced for players 2 (73.6%), who are disfavoured by the salient strategy in *bs*.

Experiment *SERIAL* implements both unlinked and decomposed games in order to make decisions in the first component stochastically binding. Subjects should treat the first component of a decomposed game as the first component of an unlinked game in which the strategy selected, unlike in decomposed games, cannot be changed when subjects face the second component. As evidenced by Table 9, the proportions of salient strategy choice in both decomposed and unlinked games are very similar and their difference is not statistically significant. This provides evidence that our experimental manipulation was successful and that subjects treated choices in the first component as binding.

First Component	Decomposed games		Unlinked games	
	*P*1	*P*2	*P*1	*P*2
bs	0.79	0.37	0.77	0.40
pc	0.80	0.84	0.84	0.83

Table 9: Proportion of salient strategy in the first component in *SERIAL*.

5.5 The unlinked games

Table 10 reports proportions of salient strategy choices in unlinked games by game type and component. Our notation uses × for unlinked games, e.g. $pc \times pc$. These games feature only in *SERIAL* and differ from decomposed games in that players' actions are not constrained to coincide between components.

Both components of the unlinked game $pc \times pc$ show choice frequencies of salient strategies above 80%. In line with our predictions, these frequencies are not significantly different from those observed in the simple PC game ($p = 0.104$ and $p = 0.724$ for PC vs. $pc1$ and $pc2$ respectively). Similarly, the choice frequency in each individual component of $bs \times bs$ is not statistically different from the average frequency observed in the simple BS games ($p = 0.694$ and $p = 0.964$ for average BS vs. $bs1$ and $bs2$ respectively). These results are also supportive of assumption 2 on the size of the component game payoffs.

	$pc \times pc$		$bs \times bs$		$pc \times bs$		$bs \times pc$	
Players	$pc1$	$pc2$	$bs1$	$bs2$	$pc1$	$bs2$	$bs1$	$pc2$
All	0.807	0.846	0.578	0.598	0.853	0.603	0.591	0.716
$P1$	–	–	0.791	0.464	0.868	0.779	0.750	0.804
$P2$	–	–	0.366	0.732	0.838	0.426	0.431	0.627

Notes: $pc1$ and $bs1$ are the component games displayed first; $pc2$ and $bs2$ are the component games displayed after.

Table 10: Proportion of salient strategy choices in unlinked games by component game and player.

In both unlinked games $pc \times bs$ and $bs \times pc$, subjects choose significantly more often the salient strategy in the pc component than in the bs one ($p < 0.001$). In addition, the choice frequency in pc is significantly greater in $pc \times bs$ than in $bs \times pc$ ($p < 0.001$). This difference is mainly driven by $P2$'s behaviour. When the pc component is displayed before the bs one, $P2$s choose the salient strategy 83.8% of the times. When the pc component is displayed after the bs one, the choice frequency drops to 62.7% ($p < 0.001$). As a consequence, the choice frequencies in the pc component and the simple PC game are significantly different only if the pc component is displayed after the bs one but not vice versa ($p < 0.001$ for $pc2$ vs. PC in $bs \times pc$ and $p = 0.233$ for $pc1$ vs. PC in games and $pc \times bs$). This evidence cannot be explained by decision inertia, as subjects can select a different strategy in component 2. These results therefore provide further support to the claim that the behaviour observed in the decomposed games, qualitatively similar to that observed in unlinked games, is not likely due to decision inertia.

For both unlinked games $pc \times bs$ and $bs \times pc$, salient strategy choices in the bs component are not significantly influenced by the displaying sequence ($p = 0.491$). Moreover, in line with our predictions, the salient strategy in these components is chosen as frequently as in both BS games ($p = 0.285$ for $bs1$ vs. BS and $p = 0.405$ for $bs2$ vs. BS).

Result 5 (Unlinked games)**.** *The salient strategy is chosen as often in bs games as it is in the* *simple BS games. In pc games the salient strategy is chosen as often as in the simple PC games only when it is displayed before a bs component.*

6 Conclusion and outlook

The goal of this paper was to investigate whether coordination rates in battle of the sexes and pure coordination games are influenced by the way these games are decomposed, like the concept of narrow bracketing would suggest. Our experiments indeed show increased and decreased coordination rates depending on the nature and the order of the component games.

Decomposed games provide evidence of narrow bracketing in decompositions of both *BS* and *PC* games. Most evidently, a decomposition of a *PC* game into a *bs* + *bs* game leads to a decrease in salient strategy choices compared to a the simple *PC* and *pc* + *pc* decomposition. Although all these games are equivalent in consequences, in *bs* + *bs* once opposed motives are highlighted by the first *bs* component, they cannot be fully reconciled by the second *bs* component.

Our experiment shows that the sequential display implemented in *SERIAL* increases the influence of component 1 on behaviour at the expense of component 2, as if, once subjects engage in the type of reasoning triggered by that first component, that mental state cannot easily be left behind. Similarly, unlinked games provide evidence of stronger behavioural spillovers from a *bs* component to a *pc* than from a *pc* to a *bs* one. Both observations suggest that behaviour consistent with level-k reasoning is more persistent than behaviour compatible with team reasoning. In other words, in this instance, the collective mode of reasoning is more fragile than the individualistic one and hinders possible learning transfers from the *pc* component to the *bs* one.

The game decompositions in our study illustrate how games can be framed in different ways by separating and thus emphasising different elements of the overall strategic situation. Our results show that this, in turn, can lead to significantly different player behaviour. The concepts of narrow bracketing and spillovers seem highly relevant to guide our expectations of the consequences of different game decompositions.

Thus, we believe that decompositions of games in experiments have great potential for investigating framing effects in strategic decision making. Many classic games in game theory are at least as complex as the games studied here and leave room for various ways of framing. Starting with narrow bracketing and spillovers, further behaviour changes might result from, for example, reference points, separation or integration of gains or losses, and obfuscation of the strategic elements present in a game. For example, the presentation of a prisoner's dilemma could begin with either the Pareto-optimal or the Pareto-inferior outcome and might thus impact the level of cooperation. As presentations might well reflect the way a person describes the games to herself, game decompositions can represent different mental or verbal descriptions of games and will likely find a new application in game theory beyond the theoretical and diagnostic purposes they have served so far in the literature.

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For Online Publication

A Appendices

Experimental instructions

Below are the instructions for both experiments $COMP$ and $PART$. The paragraphs that are experiment specific are enclosed in square brackets, written in italics and preceded by the experiment in which they appear.

Introduction

This is an experiment in the economics of decision-making. If you follow the instructions and make appropriate decisions, you can earn an appreciable amount of money. You will receive your earnings for today's session in cash before you leave the laboratory.

It is important that you remain silent and do not look at other people's work. If you have any questions, or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not be paid. We expect and appreciate your cooperation.

We will now describe the session in more detail. Please follow along with these instructions as they are read aloud.

Everyone in the room is receiving exactly the same instructions.

Only experiment $COMP$:

[You will be presented with thirty (30) different scenarios, one after the other. Each scenario is an interaction between you and an other person. Everyone in the room will make decisions in the same 30 scenarios.]

Only experiment $PART$:

[You will be presented with thirty-one (31) different scenarios, one after the other. Each scenario is an interaction between you and an other person. Everyone in the room will make decisions in the same 31 scenarios.]

At the end of the experiment, the computer will randomly pair you with an other person in the room and one of the scenarios will be randomly selected. The decisions that you and the other person have made in this scenario determine how much money each of you will be paid. Because you will not know which scenario will be selected until you have made decisions in all of them, you should treat each scenario as if it was the selected one. So, when thinking about each scenario, remember that it could be the selected one and think about it in isolation from the others. Your total earnings for the session will be given by the earnings from the selected scenario, plus a €4 participation payment.

The scenarios

In each scenario you will face either one or two allocation tasks. Only experiment *PART*: *[You will only discover after you face the first task whether there is going to be a second one.]*

Scenarios with one task In the scenario with one task you and the other person will be asked to choose between two options, such as the ones shown in Figure 1, by clicking on the button "Choose this option" next to it. The options are the same for you and the other person.

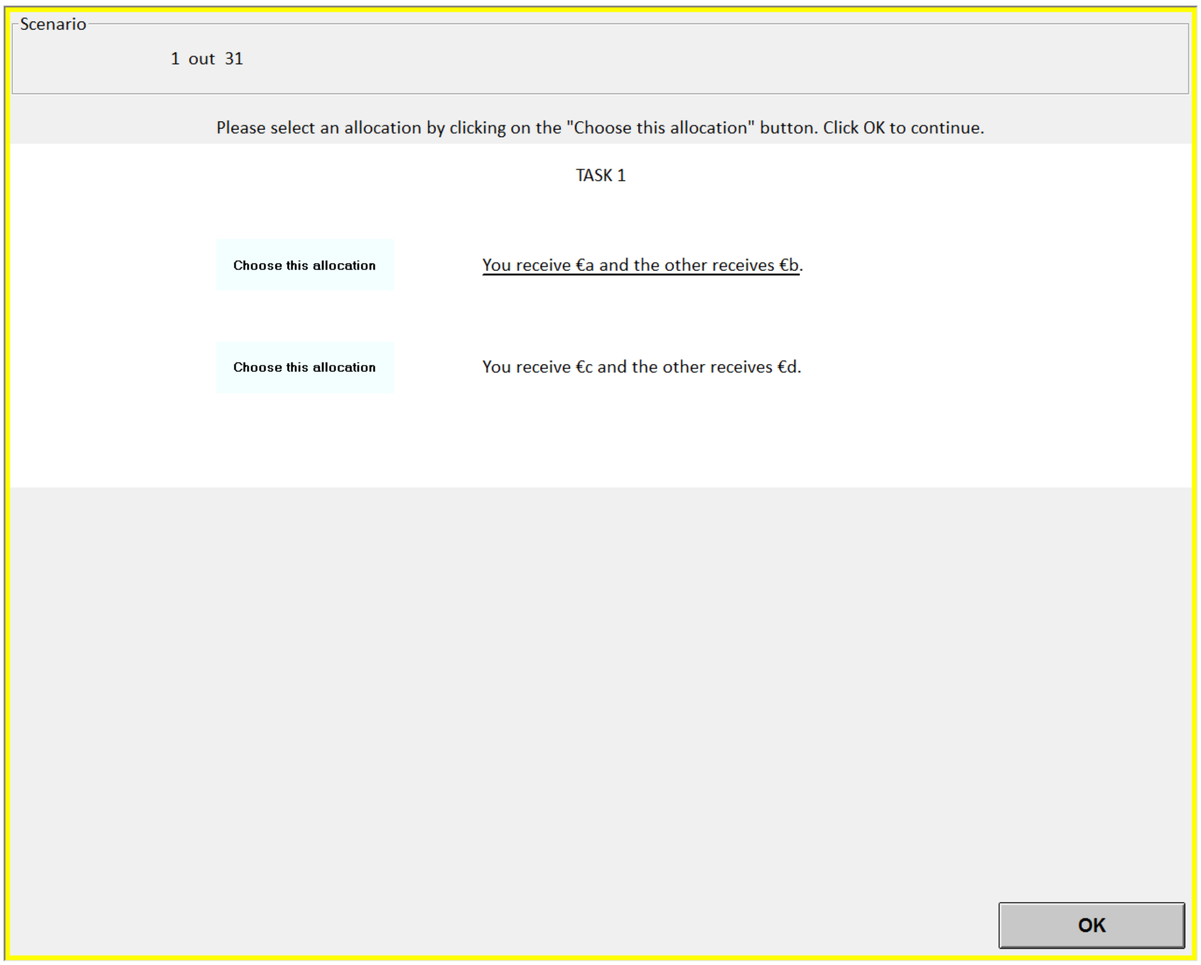

Figure 1: The Scenario with One Task

Options describe allocations of money between you and the other person. One option will always be underlined while the other one will not be underlined. Options will be identified in the same way for both you and the other person. Consider Figure 1 as an example, if in your non-underlined option, you receive € c and the other person receives € d, in the non-underlined option of the other person, you also receive €c and the other person receives €d. The same holds true for the underlined option. So, options that are highlighted in the same way for you and the other person will also report identical allocations between you and the other person.

It might happen that options feature identical allocations.

<u>You receive €a and the other receives €a</u>
You receive €a and the other receives €a

We will say that the two options however are different because one is underlined and the other one is not.

While options are uniquely identified for both you and the other person, their relative position (i.e. whether they are at the top or at the bottom) is randomly decided by the computer in every scenario. Some participants will have the underlined option at the top and some at the bottom in some scenarios, and the opposite in some others.

If you and the other person both choose the same option we will say that there is a match.

If you and the other person choose different options, we will say that there is a mismatch.

After you have made your choice, click on the button "OK" to proceed to the next scenario.

Scenario with two linked tasks

Task 1 in this scenario looks exactly the same as that of the scenario with only one task (Figure 1). However, after you click on the button "OK" in task 1, you and the other person with will be presented with a second linked task (Figure 2).

In these scenarios, you and the other person will be asked to choose one option from each task.

Let us call twins those options that, in both tasks, are either non-underlined or underlined. In scenarios with linked tasks, you both will have to choose twins. You cannot choose, for example, the underlined option in task 1 and the non-underlined option in task 2. If you do not choose twins you will not be able to proceed to the next scenario. If you were to click on the "OK" button despite this, a pop-up dialog box will appear (see Figure 3).

Notice that the term twins identifies your options in both tasks and is different from the term match. There is a match, in both tasks, only if you and the other person choose the same twins (you both choose the underlined options or you both choose the non-underlined options) and a mismatch, in both tasks, if you and other person choose different twins (you choose the underlined twins and the other chooses the non-underlined twins, or vice-versa).

Only experiment *COMP*:

[Given that decisions in both tasks are linked, you will be allowed to change the option you selected in both tasks before you click on the "OK" button. Once you leave a scenario, you will

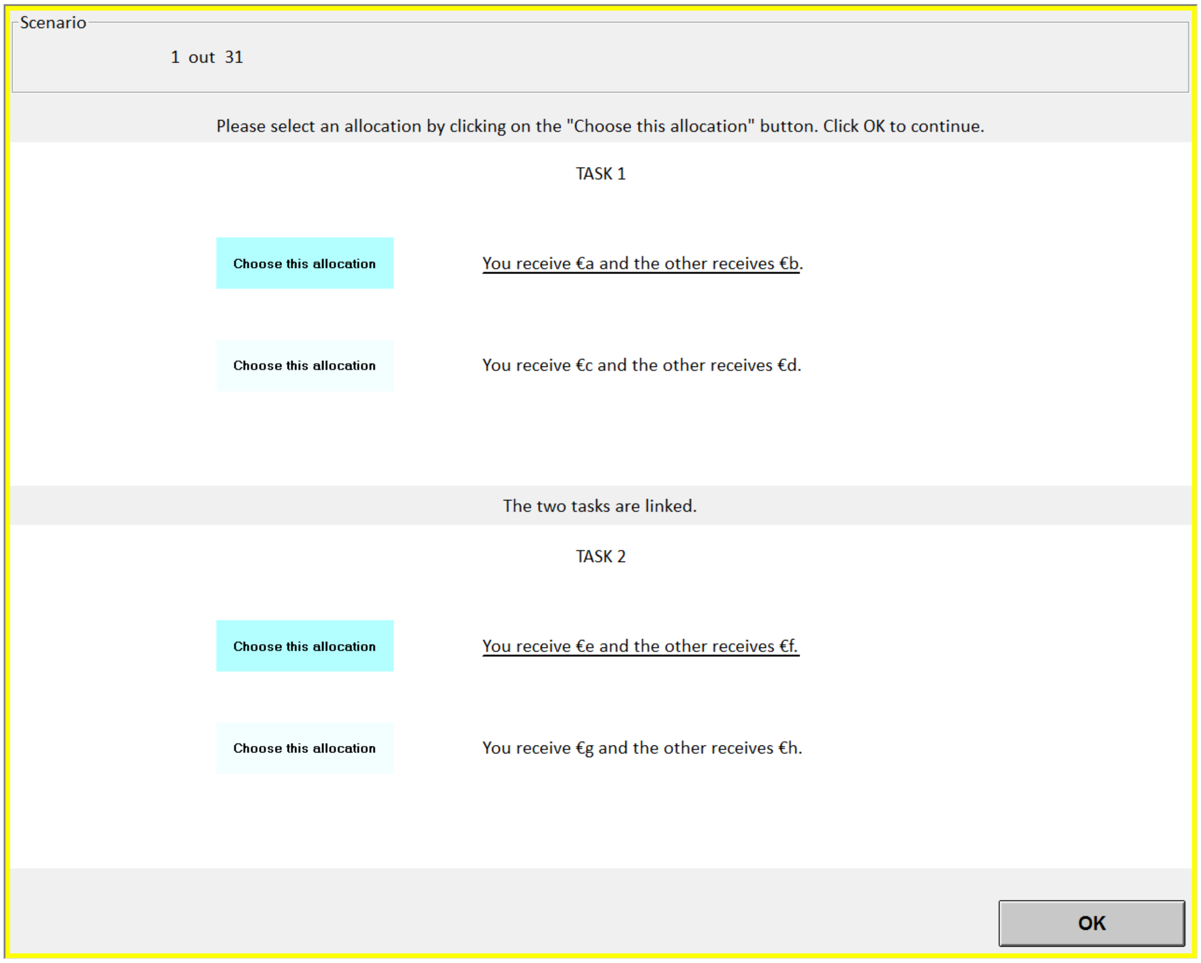

Figure 2: The Scenario with Linked Tasks

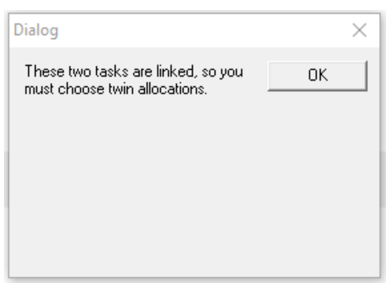

Figure 3: Not Choosing Twin Allocation in the Linked Tasks Scenario

not be able to go back to it to modify your choices. So, click on the "OK" button only when you are sure those are the options you want to choose.]

Only experiment *PART*:

[Given that decisions in both tasks are linked, you will be allowed to change the option you selected in the first task when you are presented with the second one. Once you have chosen your preferred twin options, click on the "OK" button to proceed to the next scenario.]

Only experiment *PART*:

*[**Scenarios with two unlinked tasks***

Task 1 in this scenario looks exactly the same as that in the scenario with only one task (Figure 1) and in the scenario with linked tasks (Figure 2). After you click on the "OK" button in task 1, you and the other person will be presented with a second unlinked task (Figure 4).

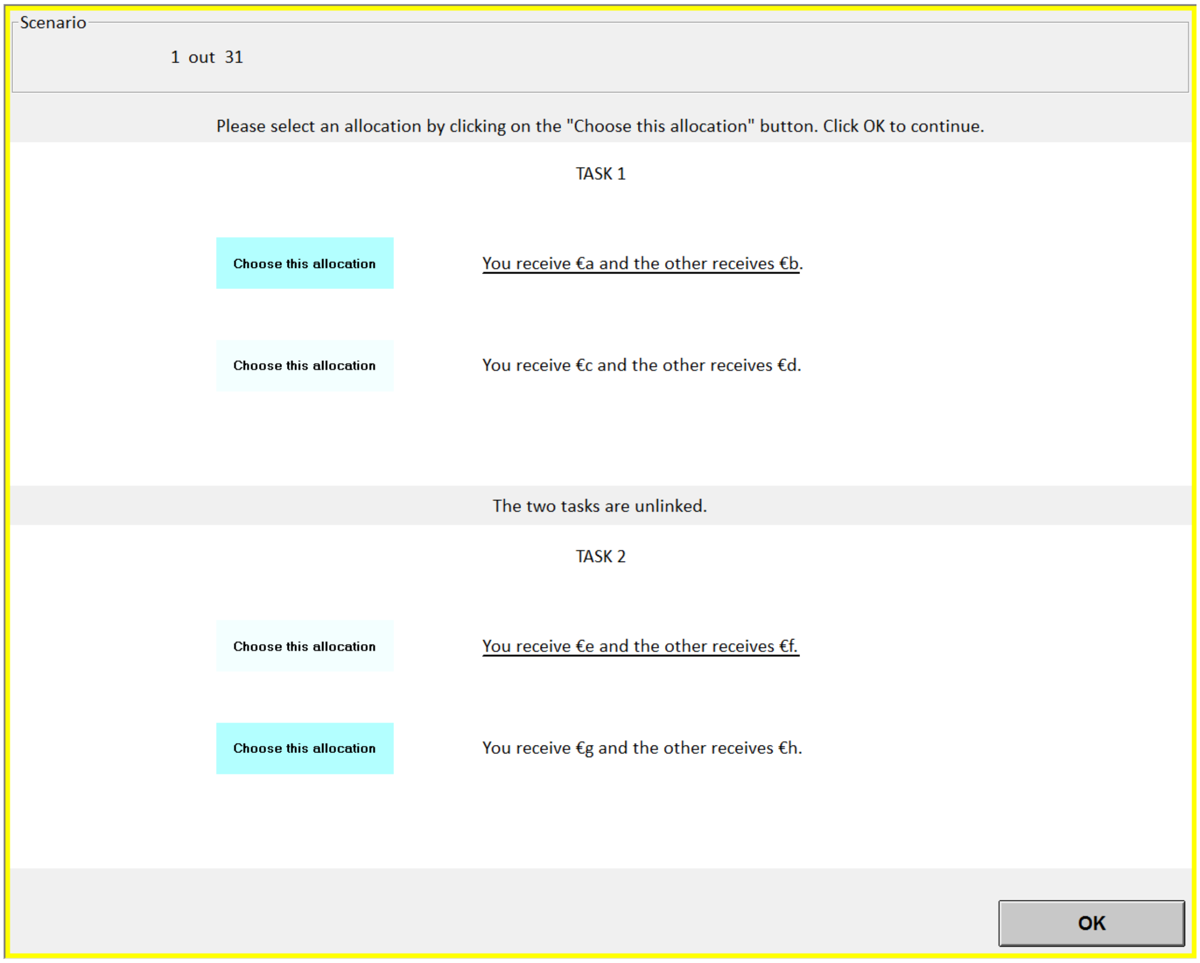

Figure 4: The Scenario with Unlinked Tasks

In these scenarios, you and the other person will be asked to choose one option from each task.

The two tasks are unlinked in that your decision in the second task is independent of your decision in the first task. That is, you can choose whichever option you prefer in the second task independently of which option you have chosen in the first task.

Given that decisions in both tasks are unlinked, you will NOT be able to change the option you selected in the first task, once you are presented with the second one.

Once you have chosen your preferred options, click on the "OK" button to proceed to the next scenario. Once you leave a scenario, you will not be able to go back to it to modify your choices. So, click on the "OK" button only when you are sure that those are the options you want to choose.

What you will know about the scenarios

Each scenario will have at least one task and some will have two tasks. You will only know whether the scenario involves two tasks after you have made your decision in the first task. Then, if the scenario has two tasks, you will also be told whether the tasks are linked or unlinked. Given the limited amount of information you have on the type of scenario, you should always choose in the first task as if your decision was final, as you might not be able to change it if the scenario involves only one task or unlinked tasks.]

Earnings

When you have finished all 31 scenarios, you will be told which of them was selected to determine your earnings. The decisions you and the other person made in that scenario will determine how much each of you will be paid. You will not be able to change your choices at this stage.

The rules that determine your earnings in each task of that scenario are:

o If there is a match you earn the amount(s) reported in the option(s);

o If there is a mismatch you earn nothing.

In the scenarios with unlinked tasks, if there is a match in one task and a mismatch in the other task, each of you will only earn the amount reported in the matched allocations and nothing in the other. In the scenarios with linked tasks instead there will be either a match or a mismatch in both tasks, as in those scenarios you can only choose twins. If there is a match each of you will earn the sum of the amounts reported in the chosen allocations in both tasks. If there is a mismatch each of you will earn nothing.