

Solve the dilemma by spinning a penny? On using random decision-making aids

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Abstract

When people find it difficult to make a decision, they may opt to let chance decide. Flipping a coin, rolling a die, or using a counting-out rhyme are well-known decision aids. When individuals directly follow the aid's suggestion, the decision aid acts as a *decider*. But when the decision aid elicits a felt response, such as liking or disliking the aid's suggestion, and individuals act upon this response, the decision aid serves as a *catalyst*. This manuscript investigates whether and how many individuals apply these two strategies. In four studies (total $N = 1135$), we focus on coin flips as one of the most common decision aids and place an emphasis on the catalyst strategy. We examine (1) the frequency of previous experiences and future willingness to use a coin flip to make decisions, (2) which affective reactions accompany the coin flip when using it as catalyst, and (3) the circumstances under which individuals are more versus less likely to accept the use of a random decision-making aid to come to a decision. These results illustrate the catalyst phenomenon but also highlight the boundary conditions of individuals' willingness to use randomness as an aid for decision making. We discuss directions for future research as well as potential applications.

Keywords: simple decision strategies, decision aids, coin flips

1 Introduction

Our days are replete with decisions. For instance, should I attend my fitness class in the evening or should I go and have drinks with my work colleagues? Should I pack a lunch or have lunch in the canteen with Alex? Most of these decisions appear straightforward, but eventually, we might come across more difficult decisions: Should I quit my job? And if I have new job offers, which one should I accept? Or, on a more personal note, should I continue dating Alex, or should I end the relationship? These decisions are more consequential and individuals might want to carefully think about all of the potential options to make a good and informed choice. To do so, they might apply a variety of decision-making strategies: gather as much information as possible about their options,

compile lists with pros and cons, or ask friends, relatives, and experts for advice.

In situations where these strategies do not result in a satisfying solution, people might turn to a different strategy: letting chance decide by, for instance, flipping a coin. If individuals directly follow the coin's suggestion, the decision aid serves as a *decider*. Interestingly, however, using a random device could come with a little twist in that the decision aid elicits a felt response, such as liking or disliking the aid's suggestion. If individuals act upon this felt response, the coin flip acts as a *catalyst* for the decision at hand. Here, we investigate whether individuals are aware of and use the decider and catalyst strategies. We furthermore research which affective reactions accompany the coin used as a catalyst and in which situations individuals are more or less likely to use a random decision-making aid. This manuscript thereby helps to understand the phenomenon of flipping a coin as one of the most common decision-making aids.

1.1 Coin flips that serve as deciders

Using a coin flip as a decider is generally considered as a means to make a fair decision (Keren & Teigen, 2010). Coin flips are widely applied in competitive situations such as sports events and are used to decide, for example, which team will start or who will choose the starting ends for each team, focusing on finding a fair solution for a decision involving two parties. However, there are also situations in which individuals use coin flips to come to a conclusion for themselves. Levitt (2020) conducted an online study in which

We would like to thank Ronja Bartlome, Sonja Borner, Helena Brunt, Christiane Büttner, and Rebekka Holzer for their help with the creation of the study materials, and all other research assistants involved in data collection. We would furthermore like to thank Dr. Meinald Thielsch for the possibility to collect data via PsyWeb and Caroline Tremble for proofreading our manuscript.

This research was supported by grant #100019_159445 from the Swiss National Science Foundation awarded to Rainer Greifeneder.

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undecided individuals described own decisions concerning, for example, whether or not to make a change, and then saw a virtual coin flip. Participants were contacted again two and six months later, and those who were told by the coin to make a change were indeed more likely to have made a change than participants who had been told to maintain the status quo (Levitt, 2020).

Prior research also shows that people see coin flips as a fair approach to making a decision (Keren & Teigen, 2010; Experiment 9), yet are nevertheless reluctant to use them because they seem “to conflict with traditional ideas about argument-based rationality and personal responsibility of the decision maker” (Keren & Teigen, 2010, p. 83). Other work (Elster, 1987) points out that individuals sometimes prefer the deliberate use of lotteries to allocate burdens, but that in general individuals have “an addiction to reason” and a strong preference for outcomes being determined by reason and not by chance (Elster, 1987, p. 177). This means that they would be willing to accept higher costs for the search for reasons justifying a decision instead of choosing a lottery. Yet, other research (Dwenger, Kübler & Weizsäcker, 2019) paints a more malleable picture, suggesting that participants sometimes even prefer and actively choose randomization, which could be driven by indecisiveness or perceived indifference. Randomness might furthermore be preferred to determine outcomes when individuals feel especially conflicted, for example, when faced with a prosocial request (e.g., a monetary donation, Lin & Reich, 2018), when facing a moral dilemma (e.g., choosing the trolley’s path in the trolley dilemma, Gordon-Hecker & Olivola, 2019), or a situation in which individuals are asked to inflict inequity (e.g., allocating a reward to one of two equally deserving individuals, Gordon-Hecker, Rosensaft-Eshel, Pittarello, Shalvi & Bereby-Meyer, 2017).

Common to all these findings is that the coin flip is supposed to determine the decision, meaning that it serves as *decider*. We now turn to a different use of random decision aids.

1.2 Coin flips that serve as catalysts

While the coin’s decider function might be its most frequent role, individuals sometimes report that the coin elicited an affective reaction, for example, feeling satisfied or dissatisfied (Jaffé, Reutner & Greifeneder, 2019), and that they acted upon this felt reaction. In these situations, the coin flip acts as a *catalyst*. We borrow this term from the natural sciences, as the coin flip serves as an additional ingredient that enhances (catalyzes) the decision-making process, presumably as it allows individuals to make a decision where they could not come to a conclusion before.

The advice of flipping a coin to better know what one wants has also been introduced in pop culture, such as in the TV series *The Big Bang Theory*. In one episode, one of

the main characters cannot make up his mind about which of two video game systems he should buy. Standing in the shop, his girlfriend then recommends the following: “How about this. They say if you flip a coin, it shows your true feelings, because you’ll either be excited or disappointed by the outcome. So, heads it’s an Xbox One, tails it’s a PS4” (IMDb, n.d.). It is not the outcome of the coin flip that is relevant, but the revelation of feelings that may then guide the decision.

Coin flips that serve as catalysts have only recently received attention in research: Studies showed that flipping a coin elicits affective reactions and triggers the feeling of knowing what one really wants (Jaffé et al., 2019), and that seeing a coin flip’s suggestion reduces information need before making a final decision (Douneva, Jaffé & Greifeneder, 2019). Both contributions show that the coin flip can act as a catalyst even in experimental settings. However, these studies use the coin flip as an experimental manipulation and do not investigate previous experiences with coin flips in general, affective reactions in the context of personal decisions, or the likelihood of applying this strategy.

1.3 The present research

While coin flips as deciders have been frequently addressed in behavioral research, much less is known about coin flips that serve as catalysts. We therefore set out to answer the following questions:

- **Question 1:** Are individuals familiar with the phenomenon of using a coin flip not only as a decider but also as a catalyst?
- **Question 2:** If yes, what affective reactions accompany the use of a coin flip as a catalyst?
- **Question 3:** In which situations are individuals more versus less likely to use a coin flip as a catalyst?

In Study 1, we assess participants’ previous experience with coin flips as deciders and as catalysts and investigate participants’ future willingness to use random decision-making aids (Question 1). In Studies 2a and 2b, we ask participants to describe an important decision they are currently facing. We then provide some of the participants with a virtual coin flip to aid their decision and investigate their affective reactions in response to the coin flip (Question 2). In Study 3, we contrast hypothetical decision scenarios with a real decision and investigate individuals’ willingness to flip a coin and use random decision-making aids within participants to provide first insight about situations in which individuals are likely to apply the catalyst strategy (Question 3).

2 Study 1

Study 1 investigated participants' previous experiences with coin flips, both as decider and catalyst, and their future willingness to use them for decisions.

2.1 Method

2.1.1 Participants and design

We recruited 467 participants (272 female, 191 male, 4 no information/missing; $M_{age} = 51.07$, $SD_{age} = 14.77$) via PsyWeb (<http://psyweb.uni-muenster.de>), an unpaid German online participant pool for people interested in psychological research. As an incentive for participation, participants could enter a lottery for an online shop voucher and receive brief feedback regarding the personality scales included in the survey. We collected data across two sessions to reduce carryover effects between measures and to keep participation time brief, and only analyzed data from participants who completed both sessions. Of those 467 participants, six indicated low carefulness during one or both parts of the study (< 5 on a scale from 1 to 9). Excluding them resulted in a sample of 461 participants.

2.1.2 Materials and procedure

Session 1

Participants were welcomed, provided informed consent and demographics (gender and age) before learning that they would answer questions about decision making and their personality. Participants first indicated whether they had ever flipped a coin to make a decision (yes vs. no), whether they had ever flipped a coin and then experienced a feeling, for example, of happiness, disappointment or relief, when looking at the outcome (yes vs. no), and whether they had ever flipped a coin to make a decision and then suddenly knew what they really wanted (yes vs. no). If participants had already flipped a coin to make a decision, we asked them to think back to the last situation where they had used a coin flip and how they had proceeded (decided in line with the coin suggestion vs. did the opposite vs. did not make a decision). We then asked all participants whether they would be willing to flip a coin to make a decision now or in the future (yes vs. no). If participants indicated that they would, we asked them to specify the decision problem that they would try to solve: the point in time at which they would use the coin (1 = *early in the decision process* to 7 = *only when they had already tried everything else*), the type of decision for which they would use a coin (1 = *very easy decisions* to 7 = *very difficult decisions*), and the impact of the decision (1 = *only affects themselves* to 7 = *affects other persons, too*). Last, we asked more generally about participants' willingness to let chance decide in the past (1 = *not at all* to 7 = *very much*),

their current and future willingness to let chance decide (1 = *not at all* to 7 = *very much*), and, as a proxy for a tendency for fatalism, to what extent the statement "whatever will be, will be" matches their personality (1 = *not at all* to 7 = *very much*).

Participants then completed the following scales: need for closure (Roets & Van Hiel, 2011), conscientiousness from the mini-IPIP (Donnellan, Oswald, Baird & Lucas, 2006), honesty-humility from the Brief HEXACO Inventory (De Vries, 2013), and belief in superstition (Fluke, Webster & Saucier, 2014). Participants could obtain automated feedback regarding their scores on the personality questions. They indicated how carefully they had completed the survey, whether we could use their data for analyses, and whether they had any general comments.

Session 2

Two weeks after Session 1, participants were invited to Session 2, which mainly included more personality scales, which were used only for exploratory analyses that are not reported in this manuscript, but can be accessed via our online repository. We included scales on preference for intuition and deliberation (Betsch, 2004; Betsch & Kunz, 2008), the buck-passing subscale from the Melbourne decision making questionnaire (Mann, Burnett, Radford & Ford, 1997), belief in tempting fate (Risen & Gilovich, 2018), counterfactual thinking for negative events (Rye, Cahoon, Ali & Daftary, 2008), and indecisiveness (Germeijs & De Boeck, 2002). Again, participants were able to obtain feedback and we asked them for carefulness, self-exclusion, and comments.

2.2 Results

Overall, 210 (45.6%) participants had used a coin flip to make a decision, whereas 251 (54.4%) had not. Out of the 210 participants who had flipped a coin in the past, 173 (82.4%) had flipped a coin and experienced a feeling (e.g., happiness, disappointment, relief) when looking at the outcome and 137 (65.2%) suddenly knew what they really wanted. With respect to the last decision for which participants had flipped a coin, 115 (55.3%) decided in line with the coin suggestion, 50 (24.0%) chose the opposite, and 43 (20.7%) did not make a decision at all. Out of all participants who had flipped a coin in the past, 101 (48.1%) were willing to use a coin flip in the future, whereas only 16 (6.4%) were willing to use a coin flip when they had never flipped a coin to make a decision before.

If participants indicated a willingness to use a coin flip, we asked them to specify the decision problem that they would try to solve. Participants indicated that they would not use a coin flip very early in the decision process, but rather towards the end when they had already tried other strategies ($M = 4.91$, $SD = 1.99$). Participants would also

rather use the coin for easy than for difficult problems ($M = 3.14$, $SD = 1.81$), and rather for problems that would affect only themselves and not others, too ($M = 2.74$, $SD = 1.67$). Overall, participants were relatively reluctant to let chance decide both in the past ($M = 3.43$, $SD = 1.59$) and now/in the future ($M = 3.35$, $SD = 1.61$).

2.3 Discussion

Study 1 investigated whether participants had previous experiences with both using the coin flip as a decider and as a catalyst (Question 1). We found that about 46% of participants had used a coin flip before and the majority of them had also experienced an affective reaction (82%) and/or suddenly knew what they wanted (65%). This indicates that a substantial part of our participants had experiences with coin flips as deciders but also as catalysts.

However, in line with previous work (e.g., Keren & Teigen, 2010), our results also indicate a certain amount of skepticism regarding the use of a random decision-making aid. Participants were relatively reluctant to let chance decide both in the past and now/in the future. If they were willing to flip a coin in principle, they would apply this strategy rather late in the decision process, more for easy decisions, and for decisions that would only affect themselves.

It is important to keep in mind that the specific numbers might substantially vary between persons and situations: Individuals differ in their past experience and future willingness to flip a coin, and the situations individuals thought of vary as well. We therefore do not draw generalizations based on this study but demonstrate people's awareness of and experiences with the phenomena we study.

3 Studies 2a and 2b

While Study 1 investigated individuals' general willingness to flip coins without reference to a specific decision, Studies 2a and 2b investigated individuals' willingness to flip coins and their reactions towards the coin outcome for current decisions. In both studies, participants described an important decision-making problem they were facing at the time of the study. Because flipping a coin can result in two outcomes only (heads or tails), participants were asked to describe a decision problem with two options. Participants were randomly assigned to a condition in which we showed them a virtual coin flip versus a control condition without a coin flip.

Studies 2a and 2b were set up as longitudinal studies with two parts. In the following, we present the data from the first assessment only, because this is where we focused on learning about individuals' decisions, introducing the coin flip, and investigating individuals' affective reactions (data from the second sessions, which were unrelated to the present

research question, are available upon request). We therefore concentrate mainly on the condition presented with a coin flip. We sampled from two populations: Swiss university students (Study 2a) and the general German population through an online panel (<http://psyweb.uni-muenster.de>; Study 2b). We pretested the structure of our study before conducting Study 2a, for which the method and results are stored in the online repository.

4 Study 2a

4.1 Method

4.1.1 Participants and design

We recruited 205 participants (122 female, 81 male, 2 no information; $M_{age} = 23.57$, $SD_{age} = 4.27$) by advertising the study on the university campus and asked participants to fill out the questionnaires on tablet computers. Of those 205 participants, three indicated that they had either already made the decision or gave replies in a foreign language, and two participants did not finish the study. Eight participants indicated low carefulness (< 5 on a scale from 1 to 9) and 13 participants had already participated in a similar study (presumably the pretest). Excluding these participants resulted in a sample of 180. Participants received chocolate as compensation for their participation.

Study 2a included one between-subjects factor: Participants were either asked to use a coin flip as a catalyst (catalyst condition) or not (control condition). Given our particular interest in the coin condition, we sampled 60% of the participants into the catalyst condition and 40% of participants into the control condition. As dependent variables, we assessed whether the coin flip elicits affective reactions. In an exploratory fashion, we also assessed participants' evaluations of their decisions in regard to difficulty, importance, potential regret of a wrong decision, and probability of deciding within the next weeks. We furthermore assessed categorizations of the decision problem and investigated whether these categorizations were associated with willingness to flip a coin.

4.1.2 Materials and procedure

After participants were welcomed to the study and provided informed consent, we asked them to describe a difficult decision they were currently facing which involved two options and which they wanted/needed to make in the next few weeks. We furthermore specified that they should think of a decision involving two options. We first asked participants to describe the problem, then the two options (including pros and cons for each), and to then label the two options with a keyword. We then asked participants to indicate the date by which they would (a) want and (b) need to make a decision.

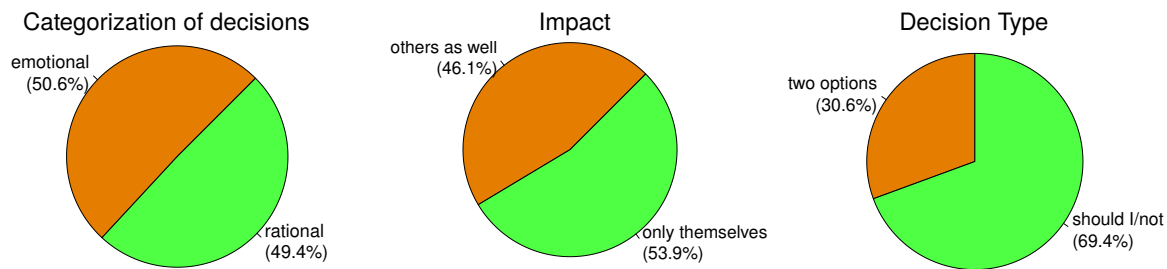


FIGURE 1: Self-categorization of participants' decisions.

At this point, we introduced catalyst-participants to the coin flip as a decision-making aid that should be used as a catalyst, not as a decider. The verbatim instructions were: “Even if it appears unusual: We would like to encourage you to use a coin flip for your decision. Of course, you will make your decision yourself, however, consider the possibility of following the coin’s suggestion, even if you’re dealing with a difficult decision.”¹ After reading the explanation, catalyst-participants could indicate if they did not want to make their decision with the help of a coin flip (tick box), and we informed them that this would not influence the remainder of the study. Catalyst-participants then saw the coin flip and were asked which of the following four reactions they experienced when looking at the coin’s outcome: satisfaction, relief, disappointment, or indifference (forced choice item). Furthermore, we assessed catalyst-participants’ wish to flip the coin again (yes vs. no). On the next page, participants indicated the strength of the feeling they had experienced (1 = *very weak* to 5 = *very strong*), and, if applicable, their reasons for wishing to flip the coin again (open text box).

Afterwards, all participants indicated how long they had been thinking about the decision problem (open textbox) and rated the decision difficulty (1 = *not difficult at all* to 7 = *very difficult*), importance (1 = *not important at all* to 7 = *very important*), potential regret of a wrong decision (1 = *not at all* to 7 = *very much*), and the probability of deciding by their set date (1 = *very unlikely* to 7 = *very likely*). Participants furthermore indicated whether their decision was more emotional versus rational, whether it only affected themselves or others as well, and whether it was a “should I / should I not” decision versus a decision between different options (all three simplified forced choices²).

¹The original instructions in German were: „Auch wenn es ungewöhnlich erscheint: Wir möchten Sie ermutigen, für Ihre Entscheidung einen Münzwurf zu nutzen. Natürlich treffen Sie die Entscheidung selbst; ziehen Sie die Möglichkeit jedoch in Betracht, der Empfehlung der Münze zu folgen, auch wenn es sich um eine schwierige Entscheidung handeln sollte.“

²We acknowledge that the binary choices we offered in regard to important decisions are highly simplified, as, for example, most decisions require some reasoning but can also be associated with affect. We were mainly interested in individuals’ rather general categorizations, but future studies might investigate decision types on a more fine-grained level.

At the end of the study, participants provided demographic information, indicated how carefully they had completed the study (1 = *not carefully at all* to 9 = *very carefully*), how difficult it was to come up with a decision problem, reasons for data exclusion, and whether they had participated in similar previous studies. Participants were asked for any further comments before being thanked and receiving chocolate as compensation.

4.2 Results

All participants came up with a decision problem that they were currently facing and which involved two options. Participants rated the decision problem as rather difficult ($M = 5.16$, $SD = 1.44$), important ($M = 5.86$, $SD = 1.26$), that they would rather regret a wrong decision ($M = 5.01$, $SD = 1.62$), and that it was rather likely they would make a decision by their set date ($M = 5.50$, $SD = 1.70$). Half of the participants (50.6%) categorized their decision as a more emotional decision, whereas 49.4% indicated it was a more rational decision. Furthermore, 53.9% indicated that the decision would only impact themselves, whereas 46.1% indicated that others would be impacted as well. Lastly, 69.4% of participants indicated having described a “should I / should I not” decision, whereas 30.6% indicated having described a decision between two options. Figure 1 summarizes these findings.

For the analyses on the reactions towards the coin flip, we focused on the respective condition only. Catalyst-participants ($N = 106$) showed a relatively high level of skepticism regarding the coin flip: More than half of them (56.6%) did not want to flip a coin to make a decision, although we had explicitly told them that they would make the decision on their own and would not need to adhere to the coin flip’s outcome. Because the coin was flipped nevertheless, we can analyze affective reactions of all catalyst-participants: 77.4% indicated having an immediate feeling when looking at the outcome of the coin flip, namely either satisfaction (38.7%), relief (16.0%), or disappointment (22.6%). Only 22.6% felt indifferent towards the outcome of the coin flip. Moreover, their feeling was moderately strong ($M = 3.40$, $SD = 0.89$). Last, 15.5% wished to flip the coin again.

When analyzing the data as a function of willingness to flip the coin, we find that participants willing to flip a coin ($N = 46$) compared to those unwilling ($N = 60$) indicated feeling satisfaction in 43.5% versus 35.0%, relief in 10.9% versus 20.0%, disappointment in 19.6% versus 25.0%, and indifference in 26.1% versus 20.0% of the cases. Although descriptively different, this distribution did not significantly differ as a function of willingness ($\chi^2(3) = 2.60, p = .457$). Similarly, feeling intensity did not differ significantly as a function of willingness (willing: $M = 3.26, SD = 0.90$ versus unwilling: $M = 3.50, SD = 0.88; t(80) = -1.19, p = .239$).

To understand whether there were situations in which catalyst-participants would be more or less likely to flip a coin, we looked at percentages of participants in the quadrants resulting from willing and unwilling participants by the three dichotomous decision categories (categorization of decision; impact; decision type). If participants decided for themselves, 44.8% did not want to flip a coin. If others were involved, this number increased to 70.8%. Whether the decision concerned a should I / should I not decision or a decision between two options did not result in differences of similar magnitude (53.4% vs. 63.6%), nor did the emotionality/rationality dimension (57.4% vs. 55.8%).

4.3 Discussion

Study 2a sheds light on affective reactions accompanying a coin flip (Question 2) and situational factors related to the willingness to flip a coin (Question 3). In the catalyst condition, 77.4% of participants reported experiencing a feeling of satisfaction, disappointment, or relief when looking at the outcome, and this feeling was moderately strong. Affective reactions did not consistently differ in regard to type or strength between participants who were willing versus unwilling to use the coin flip. Consistent with Study 1 and prior literature (e.g., Keren & Teigen, 2010), a substantial proportion of participants in the catalyst-condition (56.6%) did not want to make their decision with the help of a coin flip. The willingness to flip a coin decreased even more when others were impacted by the decision.

5 Study 2b

Study 2b again focuses on affective reactions and situational factors associated with the use of a coin flip, but with a larger sample from the general public to capture more diverse attitudes and experiences, thereby examining the generalizability of our earlier findings.

5.1 Method

5.1.1 Participants and design

We recruited 370 participants (213 female, 155 male, 2 no information/missing; $M_{age} = 49.33, SD_{age} = 15.84$) via PsyWeb (<http://psyweb.uni-muenster.de>). Of those 370 participants, two indicated low carefulness (< 5 on a scale from 1 to 9) and one of them also explicitly asked for exclusion. We excluded these two participants from the data analysis, resulting in a sample of 368. As incentive for participation, participants could enter a lottery for books on decision making.

Study 2b included the same between-subjects conditions as Study 2a (a catalyst and control condition to which participants were randomly assigned). As dependent variables, we assessed affective reactions towards the coin flip. In an exploratory fashion, we also assessed participants' evaluations of their decision (difficulty, importance, potential regret of a wrong decision, and probability of deciding within the next weeks).

5.1.2 Materials and procedure

The study setup was identical to Study 2a with the following exceptions: 1) After describing the decision problem, participants were additionally asked how long they had been thinking about the decision problem (1 = *not long*, 7 = *very long*), 2) catalyst-participants were not asked about the strength of the feeling towards the coin flip and did not have to provide reasons if they wished to flip the coin again, and 3) participants were not asked to categorize their decisions.

5.2 Results

All participants came up with a decision problem that they were currently facing and which involved two options. Participants indicated that they had thought about the decision problem for a while ($M = 4.20, SD = 1.96$), and rated the decision problem as rather difficult ($M = 5.55, SD = 1.48$) and important ($M = 5.92, SD = 1.32$). They indicated that they would rather regret a wrong decision ($M = 5.27, SD = 1.60$) and that it was rather likely that they would make a decision by their set data ($M = 5.26, SD = 1.65$).

For the analyses on the reactions towards the coin flip, we focused on the respective condition only. Catalyst-participants ($N = 177$) were again relatively skeptical about the coin flip: More than two thirds of the sample (70.6%) did not want to flip a coin to make a decision, although we had explicitly told them that they would make the decision on their own and would not need to adhere to the coin flip outcome. Because the coin was flipped nevertheless, we could analyze affective reactions of all catalyst-participants: 68.4% had an immediate feeling when looking at the outcome of the coin flip, namely either satisfaction (17.5%), relief (30.5%), or disappointment (20.3%). Only 31.6% felt

indifferent towards the outcome of the coin. Lastly, 16.9% wished to flip the coin again.

When analyzing the data as a function of willingness to flip the coin, we find that participants willing to flip a coin ($N = 52$), compared to those unwilling ($N = 125$), indicated feeling satisfaction in 19.2% versus 16.8%, relief in 36.5% versus 28.0%, disappointment in 23.1% versus 19.2%, and indifference in 21.2% versus 36.0% of the cases. These distributions did not significantly differ ($\chi^2(3) = 3.83, p = .280$).

5.3 Discussion

Study 2b investigated the coin flip phenomenon with a more diverse sample and found the same patterns as in Study 2a: Participants again reported affective reactions towards the outcome of the coin flip, namely satisfaction, relief, or disappointment, while less than a third indicated being indifferent. The majority of catalyst-participants did not want to make their decision with the help of a coin flip. Regarding the reported affective reactions, we did not find differences between willing and unwilling participants. As a tendency, however, we see that more of the unwilling participants indicated being indifferent compared to the participants willing to flip a coin.

6 Study 3

Studies 1, 2a, and 2b show that individuals are hesitant about the idea of using a coin flip to make a decision, although we framed the coin as a catalyst and emphasized that individuals could make their own decision (see Studies 2a and 2b). This reluctance may have been caused by the fact that we asked for personal and real decisions, which can often be of some importance. Going back to the work by Keren and Teigen (2010), the researchers show that willingness to use a coin flip is higher for low importance decisions (choosing between going to the theater or a concert) than for high importance decisions (deciding who will be first author on a scientific paper).

The reluctance to use coin flips for important decisions might be driven by individuals' concept of accountability. Individuals are held accountable for the decisions they express and seek approval and respect from those to whom they are accountable (Tetlock, 1985). If they believe that flipping a coin is not an acceptable strategy, as (especially important) choices should be determined by reason (see Elster, 1987), they should be unwilling to use random decision-making aids.

However, there might be situations in which it is more acceptable to use chance to support making a decision. What if the decision was not real and important, but a hypothetical scenario? A thought experiment about a choice between two

equally good restaurants in a faraway city? Would hypotheticality increase participants' willingness to use a coin flip to make a decision?

We tested this idea with Study 3, which also assessed the associations individuals have with chance. We aimed at understanding the valence of these associations and whether negative (compared to positive) associations might explain participants' reluctance to introduce a chance element (a coin flip) into their decisions. At the same time, we analyzed participants' willingness regarding hypothetical but also regarding a real decision, which allows us to compare willingness across hypothetical versus real decisions.

6.1 Method

6.1.1 Participants and design

We recruited 128 participants (69 female, 58 male, 1 no information/missing; $M_{age} = 36.85, SD_{age} = 12.72$) via Prolific. One participant did not provide a specific random event at the beginning of the study and another participant did not provide an understandable personal decision, and this exclusion resulted in a sample of 126. Participants received £1.05 (US \$1.35) as compensation for an estimated study time of 9 minutes.

Study 3 included one within-subjects factor: Participants were first asked about the likelihood of flipping a coin for six hypothetical decisions with two outcomes (hypothetical decisions) and then about the likelihood of using random decision-making aids for an upcoming real decision (real decision). For the real decision, we asked for random decision aids in general and not only for coin flips, because participants' decisions could have entailed more than two options. Both self-reported likelihoods for hypothetical and real decisions served as dependent variables.

6.1.2 Materials and procedure

After giving informed consent, participants were asked to think back and describe a past random event. They were then asked how much randomness/chance played a role in this situation (1 = *not at all*, 7 = *very much*), how positive or negative the event was (1 = *very negative*, 7 = *very positive*), how consequential the event was for themselves and their life (1 = *there were no consequences*, 7 = *very big consequences*), and when the event took place (drop down). After this introductory part, participants learned that the aim of the study was to investigate whether individuals use decision aids in different situations and that we were particularly interested in random decision aids, such as counting-out rhymes, die rolls, or coin flips. Participants were then presented with six short scenarios in an order randomized for each participant (choices between two hotels, restaurants, films, dresses, theater tickets, and city trips; materials can be found in the online repository). Participants indicated how likely it was

that they would flip a coin to help them decide between the two options on an 11-point Likert scale (1 = 0%, 11 = 100%). Next, participants were asked to briefly describe a real upcoming decision that they needed to or would like to make soon. We then asked how important the decision was for them (1 = *very unimportant*, 7 = *very important*) and how willing they were to use a random decision aid to help them make this decision (1 = 0%, 11 = 100%). Lastly, participants were asked how carefully they had completed the study (1 = *just clicked through*, 9 = *seriously answered the questions*), whether there were any reasons not to analyze their data, demographics (gender and age), and whether they had any comments.

6.2 Results

All participants described a random event ($M = 6.06$, $SD = 1.20$), that was of rather positive valence ($M = 5.18$, $SD = 2.26$) and moderately consequential ($M = 3.27$, $SD = 1.98$).

For the hypothetical scenarios, participants' self-reported likelihood of flipping a coin to help make the decision was moderately high with $M = 4.19$, $SD = 2.40$ (31.93% when translated back to probabilities). Across scenarios, the likelihood varied: $M = 3.37$, $SD = 2.60$ for hotels; $M = 3.80$, $SD = 3.04$ for dresses; $M = 3.96$, $SD = 2.81$ for restaurants; $M = 4.10$, $SD = 3.05$ for city trips; $M = 4.91$, $SD = 3.16$ for tickets; and $M = 5.02$, $SD = 3.31$ for films.

For the real decisions, participants indicated that these were quite important ($M = 5.69$, $SD = 1.42$) and that participants were not particularly willing to use a random decision-making aid to help with this decision ($M = 2.65$, $SD = 2.27$, 16.51% when translated back to probabilities).

Next, we wished to compare willingness to use chance for the hypothetical scenarios and the real decisions. This comparison would be questionable if hypothetical and real decisions strongly differed in content. To find out, we asked an independent coder to classify the real decisions into the categories used for the hypothetical decisions in regard to the content area, namely holidays, food, entertainment, and consumer goods, or other, if no category was applicable. In the resulting coding, 30.95% of decisions were categorized into consumer goods, 15.87% into holidays, 15.87% into entertainment, and 5.56% into food. Only 31.75% could not be categorized. All in all, these results reflect a strong content overlap between the hypothetical and the real decisions, allowing us to proceed with a comparison of the willingness to use chance. To this end, we averaged participants' likelihood ratings across the six scenarios and compared the resulting mean to their willingness rating for their real decision with a paired-samples t-test. Results revealed that willingness was significantly lower for real than for hypothetical decisions with a mean difference of 1.54 ($t(125) = 7.07$, $p < .001$, $d = 0.63$). If we include only participants that described a real decision that was categorized as content-wise similar to

the hypothetical decisions (total 68.25%), results are similar: the mean difference was 1.27 ($t(85) = 4.88$, $p < .001$, $d = 0.53$).

The correlation between self-rated importance of the personal decision and willingness to use a random decision-making aid to make the personal decision was not significant ($r(124) = -.07$, $p = .463$). As reported above, the valence of the past experience involving randomness was rather positive and neither correlated with participants' likelihood to flip a coin for hypothetical decisions ($r(124) = .06$, $p = .514$), nor with their willingness to use random decision-making aids for real decisions ($r(124) = -.09$, $p = .291$).

6.3 Discussion

Study 3 shows that participants' aversion to random decision-making aids was less pronounced when it came to hypothetical compared to real decisions. When presented with various hypothetical decisions, participants reported a relatively higher likelihood of using a coin flip to help them make a decision (on average, 31.93%). Within real decisions, however, we do not find that higher importance was associated with higher or lower willingness to flip a coin, but as personal decisions were generally rated as quite important, we believe that this result should be interpreted with caution.

Summarizing Study 3, one could speculate about further possibilities to understand and reduce individuals' reluctance regarding random decision-making aids. One important aspect could be an even stronger explanation of the catalyzing phenomenon, to show individuals that flipping a coin can be a helpful strategy that still allows the expectations associated with accountability to be fulfilled (Tetlock, 1985). Within Study 3 we used a concise description of the catalyst, which frames the coin flip as *helping* to make the decision. Here, we show that, even in the context of a milder catalyst frame, willingness can critically differ between personal and hypothetical decisions. Using a more versus less detailed description might prove to be another moderator of participants' willingness to flip a coin and might strengthen versus weaken the differential enthusiasm for flipping a coin for hypothetical versus personal decisions.

7 General Discussion

When people face a difficult decision, they might use a variety of strategies to come to a conclusion. In this manuscript, we investigate coin flips as a possible strategy. Coin flips can be used in different ways: They can serve as a decider and determine the decision for the individual, or they can act as a catalyst, meaning that they elicit a felt response to which individuals react. We addressed three research questions by examining both phenomena:

Question 1: Are individuals familiar with the phenomenon of using a coin flip not only as a decider but also as a catalyst? We investigated participants' past experiences with coin flips in Study 1 and found that 46% of participants had used a coin flip to decide before. Of those, 82% had experienced a feeling and 65% indicated that when they had looked at the outcome, they suddenly knew what they wanted. This shows that participants are familiar with coin flips as decision-making aids, and if they had used them in the past, many had experienced them as catalysts.

Question 2: If yes, what affective reactions accompany the use of a coin flip as a catalyst? When experimentally confronting undecided participants with a coin flip as a catalyst, the majority experienced an affective reaction when looking at the outcome. These reactions were diverse: 25% were satisfied, 25% were relieved, 21% were disappointed, and only 28% were indifferent (weighted average across Studies 2a and 2b). Willingness versus unwillingness to flip a coin did not significantly change the pattern in the studies. Some participants furthermore wished to flip the coin again (16%, weighted average across studies), indicating a translation of these affective reactions to behavioral intentions. It seems that participants experience negative or positive feelings that allow them to qualify the coin's suggestion by signaling a form of liking or disliking that might then be used as a heuristic to make a decision.

Question 3: In which situations are individuals more versus less likely to use a coin flip as a catalyst? In general, we find a rather strong reluctance to use a coin flip to aid decision making, especially when we asked about real and personal decisions in which other people are involved as well. First, individuals seem more likely to use random decision-making aids for hypothetical decisions (32%) compared to real decisions (17%; see Study 3). Second, when being asked directly in Study 1, participants reported being more likely to use the coin flip towards the end of the decision process when they had already tried other strategies, more for easy than for difficult problems, and a little more for problems that would affect only themselves and not others, too. Third, if participants decided for themselves, 44.8% did not want to flip a coin. If, however, others were involved as well, this number increased to 70.8% (Study 2a).

7.1 Implications for future research

Study 1 shows that many participants who had used a coin flip in the past had also experienced an affective reaction, meaning that they had used the coin flip as a catalyst. One open question is whether they deliberately applied the catalyst strategy. In Studies 2a and 2b, we framed the coin flip as a catalyst to investigate felt reactions and to then make a more informed choice, meaning that the workings of the catalyst

strategy were clarified before using it. Another option could be that the coin flip is generally used as a decider and then, in some cases, elicits a spontaneous affective reaction that turns it into a catalyst. It would then work similarly to the example of individuals writing down a list of pros and cons, only to then conclude that the results are just not coming out right (Zajonc, 1980), signaling to individuals that they are not as ambivalent as they thought. Are catalysts deliberately used as such, or do they "coincidentally" become catalysts? Our data so far do not answer this question, and potential motivations associated with either approach (e.g., accountability and responsibility concerns) could be disentangled in future research.

On a more general level, our data show that many individuals are not willing to use a random decision-making aid despite knowing about the phenomenon of flipping coins or also having experienced it as a catalyst. This skepticism may reflect individuals' preference for "argument-based rationality" (Keren & Teigen, 2010, p. 83) and for solutions determined by reason (Elster, 1987), as they expect to be held accountable for judgments and decisions (Tetlock, 1985). This preference for reason-based decisions may come at a cost: Trying to gather additional reason-based information, postponing, or not making a decision at all can be unpleasant and associated with negative consequences for the decision maker and other individuals affected by the decision process (see Elster, 1987, for an example regarding custody decisions). If the catalyst is used to learn about emotional reactions towards options, and if this affect-based information is beneficial to the decision (see, e.g., Bechara, Damasio, Tranel & Damasio, 1997; Chang & Pham, 2013; Gigerenzer, 2007; Kahneman, 2011; Loewenstein & Lerner, 2003; Schwarz & Clore, 1988), it could be perfectly rational to use a random decision-making aid as it maximizes utility (Li & Hsee, 2019).

Eventually, individuals could believe that the catalyst may allow them to discover their "true self" (Schlegel, Hicks, Davis, Hirsch & Smith, 2013). As a result, one could argue that using a catalyst could lead to an overweighing of affective compared to other information (see for example the literature on emotional reasoning, e.g., Arntz, Rauner & Van den Hout, 1995), meaning that this information would be given more weight than it should and, in turn, not maximize utility.

We tentatively speculate that a psychoeducational approach may prove fruitful. First, one could explain the monetary and psychological costs associated with procrastination and decision paralysis. One could also highlight how a coin flip can not only serve as a decider, but also as a catalyst, meaning that individuals are not bound to chance alone, but can still feel responsible for their decision. Second, individuals could learn how they can benefit from taking an affect-driven approach to decision making without overweighing feelings. As research shows, including feelings may maximize utility and is therefore rational in an utilitar-

ian sense (Li & Hsee, 2019). This knowledge, in turn, could reduce the belief that only reason-based decisions are good decisions. In the end, individuals need to know that they and not the coin are making the decision and the way they can benefit from a strategy that builds on chance and the associated affect.

7.2 Conclusion

Flipping a coin can be a fruitful strategy to support decision making. Individuals can either use the coin to make a decision (decider) or to investigate their felt reactions and then use these feelings as further decision input (catalyst). Both can be a worthwhile strategy, especially when running out of ideas or needing a new perspective by including feelings as additional information. One could argue that if coming to a conclusion is important and necessary, and that taking affect into account maximizes utility and does not deteriorate decision quality, there is no loss but only potential gain “to solve the dilemma by simply spinning a penny” (Hein, 1998).

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