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Clumped or Piecewise? Evidence on Preferences for Information

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In this paper we examine individuals' attitudes toward the timing of information. We test a theoretical prediction that people prefer to get information "clumped together" rather than piecewise. We conduct a controlled lab experiment where subjects participate in a lottery and can choose between different resolutions of uncertainty (clumped or piecewise) and analyze which kind of resolution is preferred. Two additional treatments allow us to get a quantitative measure of subjects' preferences over different information structures. Our data provide little support for a systematic aversion to piecewise information on the aggregate level. In additional treatment conditions, we demonstrate the robustness of our findings and explore potential explanations.

Data, as supplemental material, are available at http://dx.doi.org/10.1287/mnsc.2013.1884.

Keywords: reference-dependent preferences; loss aversion; information preferences; news utility; anticipatory emotions; experiment

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1. Introduction

The selection and processing of information is a key element in virtually all areas of economic decision making. Individuals facing economic choices—e.g., investing in education, choosing an optimal health insurance plan, buying a house, or deciding how much to save for the future—need to choose sources of potentially helpful information and process this information to be able to make an informed decision. Likewise, economic choices affect the kind, structure, and timing of information decision makers receive. A decision to participate in a risky enterprise implies that the decision maker will receive news about the success or failure of the enterprise in the future. Therefore, attitudes toward or preferences to information structures can be an important factor influencing choices and behavior.

Furthermore, the structuring of information can serve as a policy or managerial instrument. Policy makers, when providing information on, for example, the current state of political reform or consequences from a natural disaster, need to take the impact of the timing of information provision into account. Likewise, the transmission of information is an important managerial task. Managers need to inform workers about recent promotion decisions, imminent layoffs, or bonus payments. They also need to inform investors, interest groups, or public administration about firm activities. In all these examples, managers can structure this information to their own advantage by, e.g., delaying it, speeding it up, or conveying it piece by piece. The traditional economic approach to decision making, however, neglects that the information an individual receives might have direct utility consequences.

Some theories, such as in Loewenstein (1987), Caplin and Leahy (2001, 2004), and Kőszegi and Rabin (2009), have incorporated attitudes toward information and anticipatory emotions into models of decision making. Loewenstein (1987) shows theoretically that anticipatory emotions can lead to a preference for delaying pleasure and accelerating pain. Caplin and Leahy (2001) incorporate anticipatory emotions toward uncertainty resolution into an expected utility framework and analyze the consequences, for example, on portfolio choice. In another paper, Caplin and Leahy (2004) use an expected utility framework with anticipatory emotions to analyze how much information an expert should transmit to a poorly informed person. Kőszegi and Rabin (2009) develop a model where decision makers are loss averse with respect to anticipated belief changes.[1] Their model provides explanations for various phenomena such as loss aversion over wealth,

[1] The idea that reference points are determined by rational expectations has been developed in Kőszegi and Rabin (2006, 2007). Similar approaches can be found in the disappointment aversion models of Bell (1985), Loomes and Sugden (1986), and Gul (1991). Several empirical studies provide support for expectation-based reference points; see, for example, Abeler et al. (2011), Crawford and Meng (2011), Gill and Prowse (2012), and Ericson and Fuster (2011). More recent experimental work has identified limitations of expectation-based reference dependence (see, e.g., Gneezy et al. 2013, Heffetz and List 2014).

overconsumption, and precautionary savings. A key prediction of Kőszegi and Rabin is that individuals are averse to piecewise information. Thus, they should prefer to receive information in one piece rather than piece by piece. Similar implications are derived in theoretical work by Palacios-Huerta (1999) and Dillenberger (2010). Palacios-Huerta develops an argument why people might prefer clumped information based on the model of disappointment aversion by Gul (1991). Dillenberger considers a general class of recursive, nonexpected preferences over compound lotteries and shows equivalence between a preference for information in one piece and the so-called "certainty effect" observed by Kahneman and Tversky (1979, p. 263). Empirically, however, little is known about preferences for clumped or piecewise information. In this paper, we use a controlled lab experiment to test the implication that people have a preference for information in one piece. As a whole, we find little support for this prediction.

To examine a preference for clumped information, we focus on the predictions derived in Kőszegi and Rabin (2009). In the experiment, subjects can choose how they want to be informed about the outcome of a lottery. They have two options: either they learn the outcome of the lottery in one piece or they are sequentially informed about it. We ensure that in the clumped condition, no information is delayed compared to the piecewise condition.[2] Subjects' choices allow us to analyze which information structure is preferred. Two additional treatments allow us to specify a willingness to pay, i.e., a quantitative measure. In these treatments, subjects cannot choose between clumped or piecewise information but are exposed to either one. A subject's choice in these treatments is to state a willingness to pay for participating in the lottery. Comparison of the average willingness to pay between the two treatments provides a quantitative measure for preferences over different information structures.

To gain clean evidence on information preferences, we deliberately chose a tightly controlled, abstract lab environment. Possible drawbacks of this approach are discussed in Levitt and List (2007). They provide several reasons why findings from lab experiments might not easily generalize to field settings. Relatedly, several papers have shown that markets and market experience are factors that potentially attenuate nonstandard preferences that have been documented in the lab. List (2003, 2004) shows that real market experience mitigates the endowment effect.[3] In the context of social preferences, List (2006) shows that individuals that display prosocial behavior in a lab environment behave in a much more self-interested way in a real marketplace.[4] Ultimately, fieldwork as well as an analysis of market implications in the area of information preferences will be needed, but we believe that studying individual behavior in a controlled lab environment is an ideal starting point to answer our question of interest.

Summarizing our results, we do not find systematic evidence that subjects are averse to piecewise information. When subjects can directly choose between the two information conditions, only slightly more than 50% prefer to receive information in one piece. This is only compatible with a preference for clumped information if one is willing to allow for very high error rates in subjects' choices. The average willingness to pay for the lottery is more than two euros higher when subjects are sequentially informed about the outcome of the lottery. We can reject the null hypothesis that subjects' willingness to pay for the lottery is higher in the clumped information condition. The key drivers of a preference for information in one piece in Kőszegi and Rabin (2009) are loss aversion and anticipatory emotions. We measure the degree of loss aversion as well as anticipated emotions on an individual level. We find that substantial fractions of subjects exhibit high degrees of loss aversion and anticipatory emotions. However, even for those subjects, we do not find evidence for an aversion against piecewise information.

Using a series of control treatments, we examine the robustness of our findings and explore potential explanations. We show that our findings depend on neither the time lag between the different pieces of information nor the actual protocol of information transmission. A possible explanation for our results could be that subjects have a preference for delayed information, which, in our context, would imply a preference for information piece by piece. Kocher et al. (2009) find that subjects holding a lottery ticket have a preference for delayed resolution of risk and that this

[2] In changing the information structure from piecewise to clumped, information is necessarily accelerated or delayed. Thus, theoretical predictions in this context also require theories about the preference relation toward early or delayed information. Kőszegi and Rabin (2009) predict that people should (weakly) prefer early to delayed information. Consequently, Kőszegi and Rabin's precise prediction is that people prefer clumped information, as long as no information is delayed through clumping.

[3] In a laboratory market experiment, Camerer (1987) analyzes different well-established biases in probability judgment and finds that these biases do not extend to market outcomes. Note that there are also examples where individual biases do extend to aggregate outcomes in experimental market settings (see Gneezy et al. 2003, Enke and Zimmermann 2013).

[4] Similarly, Benz and Meier (2008) find that prosocial behavior is more accentuated in the lab compared with the field. However, they also show that prosocial behavior measured in the lab is predictive of prosocial behavior in a field setting. Baran et al. (2010) show that a measure of reciprocity elicited in the lab predicts related behavior in a field environment.

preference is driven by positive anticipatory emotions.[5] We ran an additional treatment where subjects could choose between receiving clumped information where information is accelerated, piecewise information, and clumped information where information is delayed. We find that some subjects indeed display a preference for delayed information. However, a substantial fraction of subjects still chooses piecewise information, even in the presence of a clumped-and-delayed-information option.

To our knowledge, our study is the first to provide a direct experimental test of whether individuals are averse to piecewise information. In addition, our results contribute to the experimental literature on myopic loss aversion (see Benartzi and Thaler 1995, Gneezy and Potters 1997). Gneezy and Potters (1997) let subjects repeatedly go through risky investment choices and vary the frequency with which they received feedback regarding the outcome and with which they could make their choices. They find that investments in the risky asset are higher when the frequency of feedback and choices is low. Haigh and List (2005) replicate this result with professional traders. One question that arises is whether these results are due to the frequency of choices or the frequency of feedback. Our findings suggest that myopic loss aversion is most likely not driven by a direct preference for a clumped timing structure in the resolution of risk.[6]

There exists a small empirical literature on informational preferences, but no incentivized study addresses the question if subjects prefer clumped information over piecewise information. Chew and Ho (1994) and Ahlbrecht and Weber (1997) are early examples. Both use questionnaire formats to examine preferences for different resolutions of uncertainty.[7] More recently, several incentivized experiments were conducted. Eliaz and Schotter (2007) find that subjects are willing to pay for earlier reception of noninstrumental information. Eliaz and Schotter (2010) show evidence for a demand for noninstrumental information about the likelihood that a risky choice was optimal. Van Winden et al. (2011) examine how investment decisions are affected by a delay in the resolution of risk. They find a significant impact of the delay of noninstrumental information and show that emotions play a central role in explaining their results. Kocher et al. (2009) find evidence that subjects have a preference for delayed resolution of risk in the context of buying lottery tickets.

The remainder of the paper is organized as follows. Section 2 describes the experimental design and states our hypothesis. Section 3 shows results, and §4 concludes.

2. Experimental Design and Hypothesis

An environment where preferences to the timing of information can be studied needs the following features:

i. *Noninstrumentality of information*: Information needs to be on a predetermined event that cannot be affected by subjects such that the "standard" expected utility theory prediction is indifference toward the timing of information.

ii. *Meaningful time delays*: We need to create an environment where the variation in the timing structure involves different time periods in the perception of subjects. Although there is no theoretical guidance regarding the length of a time period, very small variations might be particularly problematic.

iii. *Absorption of information*: To have full control over timing structures, we need to make sure that subjects absorb information at the moment they receive it.

2.1. Experimental Design

We designed an experiment that captures all three features discussed above. We studied a total of three main treatments. The treatments, information conditions, and the different steps of the experiment are illustrated in Table 1. In the CHOICE treatment, subjects were endowed with a lottery ticket. A central characteristic of the lottery was that it contained a natural sequence of three signals about the outcome of the lottery. Each of the three signals served as a piece of information. Since the lottery outcome could not be affected by subjects, information was noninstrumental. Subjects could choose how they wanted to be informed about the outcome of the lottery. We offered two possibilities: information in one piece or sequential information. Given our goal to make variations in the resolution

[5] Schweizer and Szech (2013) show that risk aversion over anticipated payoffs implies that decision makers want to delay information or do not want be informed at all. Also, Epstein (2008) provides conditions under which decision makers want to delay information in an axiomatic framework with anticipatory feelings. Relatedly, Loewenstein (1987) argues that individuals might want to delay pleasurable consumption because this prolongs positive anticipation.

[6] Note that Bellemare et al. (2005) provide evidence in the opposite direction. They conduct an experiment similar to Gneezy and Potters (1997), with the additional twist that their design allows for disentangling the effects of frequency of feedback from those of frequency of choices. They find that manipulating feedback is sufficient to generate myopic loss aversion. This finding is compatible with a preference for clumped information. Langer and Weber (2008), however, document the opposite. They identify frequency of choices as the relevant factor that drives myopic loss aversion. Fellner and Sutter (2009) find that both factors (frequency of feedback and frequency of choices) are important for myopic loss aversion.

[7] Ahlbrecht and Weber (1997) test predictions of the Kreps–Porteus model (Kreps and Porteus 1978) by trying to identify a relation between preferences over different one-shot resolutions of uncertainty and preferences over different gradual resolutions of uncertainty. Their findings do not support the Kreps–Porteus model. Chew and Ho (1994) present some evidence that people want to delay the resolution of uncertainty, at least if potential gains are involved.

Table 1 Illustration of Experimental Design

Monday	Tuesday	Wednesday	Thursday	Friday
(BonnEconLab)	(Phone call)	(Phone call)	(Phone call)	(Experimenter's office)
—Main decision Treatment CHOICE: Clumped vs. piecewise Treatment CLUMPED: Willingness to pay for lottery Treatment PIECEWISE: Willingness to pay for lottery	Clumped condition: —Information about outcome of lottery Piecewise condition: —First piece of information about outcome of lottery (result of first die roll)	Clumped condition: —No further information about lottery Piecewise condition: —Second piece of information about outcome of lottery (result of second die roll)	Clumped condition: —No further information about lottery Piecewise condition: —Third and final piece of information about outcome of lottery (result of third die roll)	Payment

of uncertainty meaningful, we decided to run the experiment over consecutive days. If subjects preferred to receive information clumped, the three signals were collapsed into one. Subjects were informed in one piece about the final outcome of the lottery on day 2 of the experiment. If subjects chose to receive information piecewise, they were sequentially provided with the three pieces of information. They learned the first piece on day 2 of the experiment. One day later they received the second signal. On day 4 they learned the third and final piece of information regarding the lottery outcome.[8] To make sure that subjects absorbed information by the time we revealed it, we informed them via phone calls. By using the telephone, we achieved full control over the timing of resolution of uncertainty about the lottery outcome.[9]

Part of the lottery was a starting endowment of 30 euros (one euro was worth US$1.45 at the time). A fair die was thrown three times, and the numbers thrown were added up. If the total sum after three throws was larger than or equal to 13, subjects won 50 euros, which were added to their starting endowment of 30 euros. If the total sum was smaller than 13, subjects lost 15 euros, which were deducted from their starting capital. The lottery has an expected value of about 32 euros and a standard deviation of 28.5. Each of the three die throws represented a piece of information, allowing subjects to update their beliefs regarding the outcome of the lottery.

For some subjects in the CHOICE treatment, we changed the payoff structure of the lottery. Although in the lottery above the payoff difference between winning and losing is already high, we decided to use a lottery that has an almost 10 times higher payoff difference. Subjects could either gain 500 euros or nothing.[10] As shown in §3, we find no effect of the payoff structure of the lottery on subjects' choices.

Subjects' choices between clumped or piecewise information in the CHOICE treatment allow us to qualitatively examine on an individual level which information structure is preferred. Two additional treatments, CLUMPED and PIECEWISE, allow us to specify a willingness to pay, i.e., a quantitative measure in a between-subjects design. In these treatments, subjects could not choose between the two information conditions. Instead, they were exposed to one of the two conditions and were asked to state their willingness to pay to participate in the lottery. The information conditions were identical to the CHOICE treatment. Subjects in the CLUMPED treatment received information clumped; subjects in the PIECEWISE treatment received information piecewise. The lottery was the same as above. The decision subjects had to make was to choose their willingness to pay for the lottery. We used a multiple price list format to elicit certainty equivalents. Comparison of the average willingness to pay for the lottery between the CLUMPED and PIECEWISE treatments allows us to analyze whether and to what degree subjects preferred clumped over piecewise information.

2.2. Procedural Details

In all three treatments, the experiment spanned five days, starting on a Monday and ending on Friday of the same week (see Table 1). On Monday, subjects met in the experimental lab. Subjects were instructed in detail about the lottery and the information conditions.[11]

[8] Thus when comparing the clumped and the piecewise conditions, no signals were delayed through clumping. This is important, because in Kőszegi and Rabin (2009) people only strictly prefer clumped to piecewise information if the clumped information does not involve any delay of signals; see §2.3 and Appendix A.

[9] In §2.2 we will present the exact procedures of the experiment in more detail.

[10] The lottery worked as follows: In three rounds, three dice were thrown simultaneously. Subjects won if in at least one round, all three dice showed a six. The lottery has an expected value of about seven euros and a standard deviation of roughly 58.7. As above, each of the three rounds of dice rolls represented a piece of information. In addition, these subjects received a show-up fee of 15 euros.

[11] Instructions are available directly from the author upon request or can be found online at https://sites.google.com/site/econflorianzimmermann/.

In the CHOICE treatment, subjects were informed about both information conditions; in the CLUMPED and PIECEWISE treatments, they were informed only about the information condition of the respective treatment. Then subjects had to make their choice. Thus, our central measures of interest (choice between clumped and piecewise information in the CHOICE treatment and willingness to pay for the lottery in the CLUMPED and PIECEWISE treatments) were all elicited on the first day of the experiment (Monday). When subjects left the laboratory, they received a letter that reminded them of their duties for the next days, i.e., when to call the experimenter and when to pick up the money. After all subjects had left the lab on Monday, the experimenter conducted the dice rolls. From Tuesday to Thursday, subjects had to call the experimenter once a day (between 9 A.M. and noon or between 2 P.M. and 5:30 P.M.). Subjects were told that failing to call would lead to the loss of all their earnings from the experiment.[12] During the phone calls, subjects received information about the outcome of the lottery. In the clumped information condition, subjects were informed on Tuesday whether they won in the lottery and which numbers were thrown for them. In the piecewise condition, subjects received one piece of information each day. Thus they usually did not know before Thursday whether or not they won in the lottery. Note that in both conditions, subjects had to call once a day from Tuesday to Thursday and that the duration of the phone calls was always approximately one minute. This was made clear to subjects in the instructions.[13] On Friday, subjects had to come to the experimenter's office to receive their earnings from the experiment.

In Kőszegi and Rabin (2009), two specific assumptions drive the preference for clumped information: loss aversion and anticipatory emotions. In all treatments, we elicited a measure of loss aversion following the procedure of Fehr and Goette (2007).[14] Subjects faced two lottery choices. Their first choice was to decide whether they wanted to participate in a lottery where they could win three euros with probability $\frac{1}{2}$ or lose two euros with probability $\frac{1}{2}$. Their second choice was to decide whether they wanted to participate in a lottery that consisted of four independent repetitions of the lottery in the first choice. Subjects were told that in the end of the experiment one of the two choices was randomly selected and implemented. In addition, we elicited anticipatory utility following the key intuition of Kőszegi and Rabin (2009). More specifically, we asked subjects about their anticipated emotional reaction in four different scenarios.[15] In two scenarios they were told to imagine that the next day they would be informed that they lost (scenario 1) or won (scenario 2) in the lottery. In the two other scenarios, subjects were asked to imagine that they would be informed sequentially about the outcome of the lottery and that they had already received two pieces of information. In one scenario (scenario 3), the two pieces made it very likely that the subject would win the lottery, but the final piece of information revealed a loss in the lottery. Likewise, in the other scenario (scenario 4), winning was rather unlikely, but then the final piece of information revealed that the subject won in the lottery. In all four scenarios, subjects could state their anticipated emotional reaction on a scale from 1 to 5, with 5 reflecting a very emotional response. In the CLUMPED and PIECEWISE treatments, we also collected a measure of risk attitudes.[16]

All experiments were conducted using paper and pencil. Eighty-seven subjects participated in the CHOICE treatment, 62 in the CLUMPED treatment, and 58 in the PIECEWISE treatment. Subjects were mostly students at the University of Bonn and were recruited from various fields (e.g., history, political science, philosophy, psychology, medicine, language studies, economics, engineering). Students of economics, medicine, and language studies represented the largest share of participants (each about 13%). Slightly more women than men participated. Experiments were conducted in summer 2009 and fall 2012.

2.3. Hypothesis

Here, we derive the behavioral predictions for our treatments based on the intuition in Kőszegi and Rabin (2009) (see Appendix A for a formal statement of the proposition).

[12] In the CLUMPED and PIECEWISE treatments, some subjects did not participate in the lottery but received a fixed payment, depending on the outcome of the price list format. Nevertheless, these subjects still had to call from Tuesday to Thursday; this was made clear in the instructions.

[13] To keep phone calls somewhat natural and meaningful, regardless of the information condition, subjects were told that they would always be asked one or two additional questions and would also receive some information about the next steps of the experiment. See also §3.2 for this point.

[14] The measure by Fehr and Goette (2007) has been shown to predict loss-averse behavior in the context of labor supply. Theoretically, it can be shown that the measure not only captures status quo-based loss aversion but also captures loss aversion where the referent is determined by expectations (see Abeler et al. 2011). In addition, a similar measure is used in Abeler et al. (2011) that predicts expectation-based reference-dependent behavior in a real effort task.

[15] Eliciting (anticipatory) emotions using self-reports is a well-established technique (see Robinson and Clore 2002). Bosman et al. (2005) use self-reports to measure the effects of emotions in a power-to-take game. Reuben and van Winden (2008) use self-reports in the context of negative reciprocity. Kocher et al. (2009) and van Winden et al. (2011) have employed this technique to analyze the role of anticipatory emotions in investment choices.

[16] We elicited subjects' certainty equivalents for a lottery that paid either nothing or three euros, each with probability 0.5 (see Dohmen et al. 2011).

A central assumption in Kőszegi and Rabin (2009) is that utility depends on anticipated changes in beliefs about current and future consumption. Beliefs are derived from rational expectations, and people are loss averse with regard to changes in their beliefs. Loss aversion in belief changes implies an aversion toward the gradual resolution of uncertainty, since piecewise information exposes people to fluctuations in their beliefs. These expected fluctuations in beliefs do not cancel in utility terms, because bad news decreases utility more than good news increases it.

In addition, the model assumes that people care (weakly) less about changes in beliefs the farther away the time of belief change lies from the actual point of consumption. This implies that people (weakly) prefer to receive information sooner rather than later. Therefore, the precise prediction of Kőszegi and Rabin (2009) is that people prefer to receive information clumped rather than piecewise, as long as no information is delayed through clumping. Thus, we can state the following hypothesis.

Hypothesis. *In the CHOICE treatment, subjects choose to receive information in one piece. The average willingness to pay for the lottery should be higher in the CLUMPED treatment compared with the PIECEWISE treatment.*

3. Results

3.1. Main Findings

Table 2 summarizes key findings from the three main treatments as well as our measures of loss aversion, anticipatory emotions, and risk. First, consider the CHOICE treatment. Only slightly more than half of subjects (52%) preferred to receive information clumped. This is inconsistent with Kőszegi and Rabin (2009), who predict a clear preference for the clumped information condition. However, when evaluating the predictive power of the model with our data, we need to incorporate an error structure that captures possible inconsistencies and subjects' mistakes. Thus, the statistical model we evaluate is one where subjects make a mistake with probability p_e. Since the model predicts that subjects prefer the clumped condition, p_e denotes the likelihood that the piecewise condition is chosen. With probability $(1 - p_e)$, subjects make no mistake and choose the clumped condition. Our first step is to simply assume that $p_e = 0.2$; i.e., we evaluate the model allowing for fairly high error rates of up to 20%. We use a simple binomial test to test the null hypothesis that our data are generated by a preference for clumped information and an error rate of 20% or lower, i.e., that $p_e \leq 0.2$. We reject the null hypothesis at any conventional level (p-value < 0.00001).

In the next step we ask which error rate we would have to assume for the data to be compatible with the model's prediction, i.e., such that we cannot reject the null hypothesis that people prefer clumped information. More precisely, we ask for which value of p_e we cannot reject the null hypothesis (at the 5% level) that people prefer clumped information, using a one-sided binomial test. We find that this threshold value of p_e is 0.3905. Thus, we cannot reject the null hypothesis that $p_e \leq 0.3905$ (p-value $= 0.05$). We conclude that our data are only compatible with the prediction of Kőszegi and Rabin (2009) if we are willing to assume that subjects make mistakes with a probability of 39%.[17]

We summarize our findings from the CHOICE treatment as follows.

Result 1. In the CHOICE treatment, only about 52% preferred the clumped information condition. Thus, we can reject the hypothesis that people prefer clumped over piecewise information, unless we are willing to assume error rates of 39% or greater.

Next, consider behavior in CLUMPED and PIECEWISE treatments. Table 2 shows that the average willingness to pay is actually about two euros lower in the CLUMPED treatment than in the PIECEWISE treatment, contrary to what one would expect if piecewise information were utility decreasing. Table 3 presents ordinary least squares (OLS) regressions. In regression (1), we regress willingness to pay for the lottery on a constant and a treatment dummy. We test and can reject the null hypothesis that willingness to pay is higher in the clumped information condition (p-value $= 0.01$; one-sided). This result is confirmed using a Wilcoxon rank sum test (p-value $= 0.02$, one-sided) and is robust when controlling for our measures of loss aversion and anticipatory emotions in various specifications, risk attitudes, or gender (see Table 3 and Table B.4 in Appendix B).[18]

[17] Recall that for some subjects in the CHOICE treatment, we changed the payoff structure of the lottery, making the difference between winning and losing more extreme. This was the case for a total of 24 subjects. Note that we find no significant effect of the different lottery. Of these 24 subjects, 14 preferred clumped information. Using Fisher's exact test, we cannot reject the null hypothesis that choices do not differ depending on the lottery structure (p-value $= 0.48$). Using a simple probit regression, regressing the choice between the information conditions on a constant and a lottery dummy delivers similar results. The coefficient of the dummy is not significantly different from zero (p-value $= 0.23$; throughout the paper, we use clustered standard errors at the session level and control for the date at which the experiment was conducted whenever applicable).

[18] Note that out of the 120 subjects, 5 failed to make consistent choices in the multiple price list format. In the analysis above we used their average switching point in the price list format. Our results are robust when using the first switching point instead or when excluding them from the sample. Note also that some subjects did not provide all answers to the additional measures we collected or answered inconsistently (in the measure of loss aversion) such that the number of observations varies between regressions in Table 3.

Table 2 **Overview of Results for Treatments CHOICE, CLUMPED, and PIECEWISE**

Treatment	Information choice	Avg WTP (SE)	Loss aversion (%)	Anticipatory emotions (%)	Avg risk attitudes (SE)	No. of observations
CHOICE	Clumped: 52% piecewise: 48%	NA	High: 29 Medium: 22 Low: 49	High: 43 Medium: 34 Low: 23	NA	87
PIECEWISE	NA	27.5 (5.18)	High: 33 Medium: 25 Low: 42	High: 37 Medium: 38 Low: 25	1.61 (0.35)	58
CLUMPED	NA	25.5 (4.39)	High: 38 Medium: 24 Low: 38	High: 34 Medium: 41 Low: 25	1.70 (0.41)	62

Note. WTP, willingness to pay.

Table 3 **Linear Regressions of Willingness to Pay on the Treatment Dummy and Several Controls**

	Dependent variable: *Willingness to pay*					
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment dummy	2.017***	2.118***	2.099***	1.821***	2.088***	2.470***
	(0.508)	(0.416)	(0.322)	(0.548)	(0.374)	(1.194)
Risk attitudes			4.973***			4.706
			(0.903)			(2.778)
Loss aversion				−0.238		−0.473
				(0.442)		(0.323)
Anticipatory emotions					−0.129	−0.150
					(0.238)	(0.208)
Controls included?	No	Yes	Yes	Yes	Yes	Yes
Constant	25.5***	26.347***	18.346***	26.988***	28.126***	21.986***
	(0.479)	(1.869)	(0.794)	(0.483)	(3.486)	(3.285)
No. of observations	120	118	116	114	62	60
R^2	0.043	0.066	0.222	0.070	0.054	0.147

Notes. OLS estimates; standard errors (in parentheses) are clustered at the session level. *Treatment dummy* = 1 if PIECEWISE, 0 if CLUMPED. *Loss aversion* captures our three-categorical measure of loss aversion. *Anticipatory emotions* captures the sum of answers to the respective questions. *Risk attitudes* captures certainty equivalent from an additonal risk elicitation task. Controls include gender and a time dummy for when the experiment was conducted (if applicable). For the coefficient of the treatment dummy, we test the null hypothesis that the willingness to pay is greater in the CLUMPED treatment and thus provide one-sided test statistics.

$^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Result 2. We reject the null hypothesis that subjects have a higher willingness to pay for the lottery when information is clumped.

3.2. Robustness and Extensions

From CHOICE, CLUMPED, and PIECEWISE treatments, we did not find evidence for an aversion to piecewise information. We conducted several additional treatments to study the robustness of our findings and to examine possible explanations. In all additional treatments, we built on and modified our CHOICE treatment, because it allows subjects to choose directly between the two information structures. It is thus ideally suited to pick up even subtle effects of our additional treatment variations.

Anticipatory emotions were only elicited for about half of the subjects from CLUMPED and PIECEWISE treatments, such that the drop in number of observations in the respective regressions is sizable.

3.2.1. Length of a Time Period. In terms of Kőszegi and Rabin (2009), the timing of information only matters if signals arrive in different time periods (in the perception of the decision maker). Therefore, in the main treatments we decided to implement an experimental design that ran over days, i.e., where the variation in the timing structure was rather pronounced. To make the variation in the timing of information even more drastic, we decided to run an additional treatment (CHOICE_WEEK). The treatment was identical to the CHOICE treatment, except that the experiment was now run over weeks. Subjects met in our experimental lab on a Wednesday and had to call the experimenter on the next day (Thursday), one week later on Thursday, and two weeks later on Thursday. On the Friday after the last phone call, subjects received their earnings from the experiment.

3.2.2. Phone Calls. We deliberately chose a setup where subjects had to call the experimenter three times, regardless of the information condition they were in. This implies that subjects in the clumped information condition did not receive any information about the outcome of the lottery during the second and third phone calls. One unintended consequence of this might be that subjects refrain from clumped information, because they do not want to make phone calls where no new information is provided, i.e., phone calls that do not seem to serve a real purpose.[19] To address this issue, we conducted an additional treatment where subjects (regardless of the information condition they were in) always had a very natural cause to call the experimenter. The CHOICE_NC (natural call) treatment was completely identical to the CHOICE treatment, except that subjects were given another additional cause to call the experimenter from Tuesday until Thursday. At the beginning of the experiment, subjects were informed that they would participate in two studies. In the first study, we measured prosocial behavior over the course of a week. Subjects were told that they would have to call the experimenter once a day, from Tuesday until Thursday. During each call, subjects played a dictator game with varying charitable organizations.[20] The second study then consisted of our information choice experiment and was completely identical to the CHOICE treatment. Thus, in CHOICE_NC all phone calls (regardless of the information condition) served a distinct purpose.

3.2.3. Delay of Information. Finally, we explore whether an alternative prediction in the context of information preferences—namely, a preference for delayed information—could potentially explain our results. Kocher et al. (2009) provide evidence for a preference for delayed resolution of risk. Such a preference could be compatible with an amended notion of Loewenstein (1987), where individuals might want to delay pleasurable consumption because this prolongs positive anticipation.[21] In our setup, piecewise information also involves a delay in information (this was crucial for our purposes, since Kőszegi and Rabin 2009 only predict a preference for clumped information as long as no information is delayed through clumping). Therefore, a preference for delayed information could possibly account for our findings and explain why so many subjects in our main treatments seem to prefer information piece by piece. We conducted an additional treatment (CHOICE_DELAY), where we added a third choice alternative: to receive all information clumped on Thursday, i.e., clumped and delayed. The treatment was exactly identical to the CHOICE treatment, apart from the additional choice option. If a preference for delayed information is the reason why many of our subjects prefer receiving information piecewise, we should now see that in CHOICE_DELAY, subjects choose to receive information clumped on Thursday instead of piecewise. Kőszegi and Rabin (2009) still predict that subjects should (at least weakly) prefer to receive information clumped on Tuesday.

3.2.4. Results. Table 4 summarizes findings from the three additional treatments. Neither the implementation of an information structure that varied over weeks rather than days (CHOICE_WEEK) nor the implementation of a natural cause to call (CHOICE_NC) significantly affected subjects' choices between information conditions. Again, we do not find clear-cut evidence for an aversion to piecewise information. Observed choices in treatments CHOICE_WEEK and CHOICE_NC are only compatible with a preference for clumped information if one is willing to assume very high error rates. Also, the proportions of subjects that prefer clumped information do not significantly differ from that in the CHOICE treatment.[22]

Turning to treatment CHOICE_DELAY, we analyze results in two different ways. Equivalently to our analysis of all the other CHOICE treatments, we start by looking at how many subjects chose information clumped and early (recall that Kőszegi and Rabin 2009 predict a (weak) preference for that option). We find that 45% of subjects selected information clumped and early. As summarized in Table 4, this fraction is not significantly different from the corresponding fraction in the CHOICE treatment, and the error rate one would need to assume such that we just cannot reject the null hypothesis (at the 5% level) that people prefer clumped and early information (using a one-sided binomial test) is 41%. The clearest prediction of Kőszegi and Rabin (2009) for the CHOICE_DELAY treatment is that no subject should choose piecewise information, since the clumped and early option is strictly better. However, we find that a substantial fraction of subjects (31%)

[19] Note, however, that in the main treatments, we already tried to make all phone calls somewhat natural and meaningful by telling subjects that during all phone calls they would receive some information about the next steps of the experiment and would be asked one or two questions. For example, subjects were reminded of their duty to call and when and where they could pick up their money. In addition, they were asked if they remembered some details of the experiment, e.g., whether they recalled the cabin number they were seated in during the session.

[20] Subjects could always decide how to split 10 euros between themselves and the respective charitable organization. In the end, one of the three dictator games was randomly selected and implemented.

[21] See also Schweizer and Szech (2013) and Epstein (2008) for formal derivations of a preference for delayed information, caused by anticipatory feelings.

[22] This also confirmed when comparing choice behavior of our additional treatments with the CHOICE treatment using probit regressions. In all comparisons, the difference is insignificant (p-value > 0.4 for all comparisons, using standard errors clustered at the session level). Findings are robust to including a dummy for when the experiment was conducted.

Table 4 Overview of Results for CHOICE_WEEK, CHOICE_NC, and CHOICE_DELAY Treatments

Treatment	Information choice (%)	p_e	Fisher's exact test	Loss aversion (%)	Anticipatory emotions (%)	No. of observations
CHOICE_WEEK	Clumped: 48 piecewise: 52	0.385	p-value = 0.705	High: 28 Medium: 25 Low: 47	High: 30 Medium: 57 Low: 13	40
CHOICE_NC	Clumped: 55 piecewise: 45	0.314	p-value = 0.849	High: 33 Medium: 29 Low: 39	High: 43 Medium: 44 Low: 13	40
CHOICE_DELAY	Clumped (early): 45 piecewise: 31 clumped (late): 24	0.41	p-value = 0.574	High: 34 Medium: 20 Low: 46	High: 33 Medium: 36 Low: 31	42

Notes. p_e again reflects the error rates one would need to assume such that we just cannot reject the null hypothesis (at the 5% level) that people prefer clumped information, using a one-sided binomial test. Fisher's exact test reports p-values for the comparison of the respective treatment with the CHOICE treatment. For comparison between CHOICE_DELAY and CHOICE, we categorize information choices in the CHOICE_DELAY treatment in two groups, depending on whether or not clumped and early information was chosen.

prefer the piecewise option. This is only compatible with an aversion to piecewise information, if one is willing to assume that more than 19% of subjects chose piecewise information by mistake (using a one-sided binomial test). Furthermore, the fraction of 31% is not significantly different from 33% (the fraction one would expect if all subjects would choose randomly).[23]

In a second step, we turn to the main motivation to conduct treatment CHOICE_DELAY to identify potential explanations for why we do not find support for Kőszegi and Rabin (2009) in our main treatments. Remember that in the CHOICE treatment, a fairly large fraction of subjects (48%) preferred piecewise information. Two broad explanations for this come to mind: First, these subjects could have a preference for delayed information (not caring about clumped or piecewise information). Second, these subjects could prefer piecewise information (not caring about whether information arrives sooner or later). Both preferences would be contrary to the predictions of Kőszegi and Rabin, and both would imply a preference for the piecewise option in the CHOICE treatment. We constructed the CHOICE_DELAY treatment such that these two alternative explanations would make different predictions, thereby allowing us to assess which one is empirically more relevant in our setup. Whereas subjects with a preference for delayed information should choose the clumped and delayed option, subjects with a preference for piecewise information should choose the piecewise option. We find that 31% of subjects in CHOICE_DELAY prefer information piecewise compared with 24% who prefer clumped and delayed information. Thus, although some subjects indeed seem to prefer delayed information, such a preference alone does not seem to be sufficient to explain our findings from the CHOICE treatment.

3.3. Loss Aversion and Anticipatory Emotions

The key driving forces of informational preferences in the setup of Kőszegi and Rabin (2009) are loss aversion and anticipatory emotions. Tables 2 and 4 summarize the distribution of our measures of loss aversion as well as anticipatory emotions for all our treatments.[24] In all treatment conditions, substantial fractions of subjects exhibit high degrees of loss aversion and anticipatory emotions. Note also that both measures do not differ across treatments. F-Tests for regressions of loss aversion and anticipatory emotions on dummies for the different treatments yield no significant difference (loss aversion: $F(5, 307) = 0.43$, p-value $= 0.82$; anticipatory emotions (using the sum of answers to the four questions): $F(5, 224) = 0.66$, p-value $= 0.66$).

Next, we analyze whether loss aversion and anticipatory emotions are predictive for subjects' informational preferences—in particular, if high degrees of loss aversion and anticipatory emotions are associated with a preference for clumped information. For this purpose we pool observations from CHOICE, CHOICE_WEEK, CHOICE_NC, and CHOICE_DELAY treatments.[25] Thus,

[23] We also test whether the fraction of subject preferring piecewise information is significantly different from the fraction of subjects that prefer clumped and early information. Using Fisher's exact test, we cannot reject the null hypothesis that the fractions of subjects choosing clumped early and piecewise information are identical (p-value $= 0.377$).

[24] We classify subjects who reject both gambles as having a high degree of loss aversion. Subjects who reject the gamble in the first choice but accept the gamble from the second choice are classified as being medium loss averse, and subjects who accept both gambles are said to have a low degree of loss aversion. Regarding anticipatory emotions, we sum up answers to the four questions and classify subjects as showing a high degree of anticipatory emotions if the sum of the four answers is either 19 or 20 (recall that 20 is the maximum score), implying that in all four scenarios a very emotional response was expected. Subjects whose sum over the four questions is 16, 17, or 18 are in the medium category, and all other subjects are classified as showing low anticipatory emotions.

[25] We categorize information choices in the CHOICE_DELAY treatment into two groups, depending on whether clumped and early information was chosen (as predicted by Kőszegi and Rabin 2009). As an additional robustness check, given the specific nature of

we have a total of 209 observations, from which 50.2% of subjects choose clumped information.[26] This proportion does not increase if we focus on subjects with a high degree of loss aversion. Actually, from this subsample ($N = 60$), only 41.7% prefer clumped information. If we consider subjects with a high or medium degree of loss aversion ($N = 106$), 46.23% prefer information in one piece. For the subsample of subjects with a high degree of anticipatory emotions ($N = 62$), 53.23% prefer information in one piece. Focusing on subjects with a high or medium degree of anticipated emotions ($N = 133$), 48.12% prefer information clumped. Finally, we can also only consider subjects who exhibit both a high degree of anticipatory emotions and a high degree of loss aversion ($N = 20$). Of these subjects, 45% prefer information clumped together. Focusing on subjects that show a high or medium degree of loss aversion and a high or medium degree of anticipatory emotions ($N = 72$), 45.83% prefer information in one piece. Thus, neither our measure of loss aversion nor anticipatory emotions deliver subgroups that show a clear preference for clumped information. These results are confirmed by probit regressions, regressing information choice on loss aversion and anticipatory emotions in various specifications (see Tables B.1 and B.2 in Appendix B).[27] In all regressions, neither loss aversion nor anticipatory emotions significantly predicts behavior.

This finding is also confirmed by CLUMPED and PIECEWISE treatments. Table 3 reveals that neither loss aversion nor anticipatory emotions significantly influence subjects' willingness to pay for the lottery. Appendix B (see Table B.4) shows that this finding also holds if we include the measures of loss aversion and anticipatory emotions as a set of dummy variables, i.e., without imposing any restrictions on the parameters.[28]

CHOICE_DELAY (with three choice alternatives), we also conduct multinomial logit regressions for the CHOICE_DELAY treatment, regressing information choice on loss aversion and anticipatory emotions. None of the measures significantly predicts behavior in the multinomial regressions.

[26] Note that we did not elicit a measure of anticipatory emotions for about half of the subjects in the CHOICE treatment, leaving 166 subjects for which we have a measure of anticipatory emotions. Furthermore, 12 subjects did not provide consistent answers in the two loss aversion lotteries and hence could not be classified.

[27] One difference between our measure of loss aversion and that used in Abeler et al. (2011) is that in our measure, one of the two lottery choices involves a compound lottery. Thus, to study robustness of our findings, in Appendix B (see Table B.3), we construct our measure of loss aversion differently, using only the choice that does not involve a compound lottery. This delivers qualitatively similar results.

[28] We can also analyze the treatment effect for different subsamples, depending on loss aversion and anticipatory emotions. In all of these subsamples, the willingness to pay for the lottery remains larger in the PIECEWISE treatment than in the CLUMPED treatment.

4. Conclusion

In this paper we tested whether people prefer to receive information in one piece rather than piecewise. We focused on the model by Kőszegi and Rabin (2009) where a preference for clumped information is driven by loss aversion over rationally expected changes in beliefs about future consumption.[29] On the aggregate level, our findings do not support the hypothesis that piecewise information is utility decreasing. In the following, we discuss several possible explanations.

First, there is a general problem of testing dynamic models of decision making as these models usually do not specify the length of a time period. In principle, time periods could be seconds, minutes, days, or months. From an empirical perspective, this is challenging. It could be that failure to support Kőszegi and Rabin (2009) is due to failure to create timing structures that affect different time periods. Note, however, that in our experiment we made a high effort to make variations in the timing structure meaningful by running the experiment over days. Furthermore, we conducted an additional treatment where we more than doubled the amount of time between different pieces of information, with no significant impact on subjects' choices.

Second, although we did not find support for the hypothesis on an aggregate level, it might be that some subjects do have preferences for receiving information in one piece. People might be heterogeneous in their preferences for different information structures, and it would be interesting to analyze which individual characteristics determine these preferences. Note, however, that neither our measure of individual loss aversion nor our measure of anticipatory emotions delivered subgroups that showed a clear preference for information in one piece.

Third, the prediction that piecewise information is utility decreasing might only hold in certain decision environments where anticipatory emotions are strong. Note, however, that expected payoffs and payoff differences between winning and losing in the lotteries in our experiment are rather large. For some subjects, the payoff difference between winning and losing was 500 euros, which is probably more than half of the monthly income of an average student in our sample. In addition, our measure of anticipatory emotions reveals that many subjects in our sample expected rather high emotional responses.

[29] Note that this prediction is not shared by models of reference dependence over actual consumption, regardless of whether the referent is based on expectations, status quo, or lagged status quo (e.g., Kahneman and Tversky 1979; Kőszegi and Rabin 2006, 2007). Therefore, our findings do not challenge these models nor the empirical evidence in support of these models.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/mnsc.2013.1884.

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Appendix A

We now formally derive the prediction of Kőszegi and Rabin (2009) we are testing in this paper. We closely follow the notation of the original model. The model is in discrete time with $T+1$ periods, 0 through T. Decision makers consume K goods. In all periods $t \geq 1$, consumption $c_t = (c_t^1, \ldots, c_t^K)$ is realized. At the beginning of period t, the decision maker holds beliefs $F_{t-1} = \{F_{t-1,\tau}\}|_{\tau=t}^T$, with $F_{t-1,\tau} = (F_{t-1,\tau}^1, \ldots, F_{t-1,\tau}^K)$ being the belief about the consumption vector in period τ. Then, some signals may arrive, and the decision maker accordingly forms new beliefs $\{F_{t,\tau}\}|_{\tau=t}^T$, where no uncertainty is left regarding consumption in period t.

Instantaneous period t utility depends on consumption in t and on belief changes in t regarding contemporaneous and future consumption:

$$u_t = m(c_t) + \sum_{\tau=t}^{T} \gamma_{t,\tau} N(F_{t,\tau} \mid F_{t-1,\tau});$$

where $m(c_t)$ denotes reference-independent consumption utility, and the terms $N(F_{t,\tau} \mid F_{t-1,\tau})$ represent "gain-loss utility" from belief changes; $\gamma_{\tau,\tau} \geq \gamma_{\tau-1,\tau} \geq \cdots \geq \gamma_{0,\tau} \geq 0$ are the weights on gain-loss utilities; $\gamma_{t,t}$ is normalized to 1. The weights γ represent the importance of new information depending on how far in advance of actual consumption the news are received. Importance decreases the earlier new information realized.

Gain-loss utilities are specified such that decision makers make ordered comparisons between current and previous beliefs about consumption. It is assumed that decision makers compare the worst percentile of outcomes under current beliefs to that under previous beliefs, the second-worst percentile under current and previous beliefs, and so on.

Formally, we define percentile p implicitly by stating that for any distribution F over $\mathbb{R}$ and any $p \in (0,1)$, the consumption level at p, $c_F(p)$ is defined by $F(c_F(p)) \geq p$ and by $F(c) < p$ for all $c < c_F(p)$. Then we can define gain-loss utility from the change in beliefs in consumption dimension k as

$$N^k(F_{t,\tau}^k \mid F_{t-1,\tau}^k) = \int_0^1 \mu(m^k(c_{F_{t,\tau}^k}(p)) - m^k(c_{F_{t-1,\tau}^k}(p)))\, dp.$$

Here, $\mu()$ is a "standard" gain-loss utility function with the following properties taken from Bowman et al. (1999):

1. $\mu(x)$ is continuous for all x, twice differentiable for $x \neq 0$, and $\mu(0) = 0$.
2. $\mu(x)$ is strictly increasing.
3. If $y > x \geq 0$, then $\mu(y) + \mu(-y) < \mu(x) + \mu(-x)$.
4. $\mu''(x) \leq 0$ for $x > 0$ and $\mu''(x) \geq 0$ for $x < 0$.
5. $[\mu'_-(0)]/[\mu'_+(0)] \equiv \lambda > 1$, where $\mu'_+(0) \equiv \lim_{x\to 0} \mu'(|x|)$ and $\mu'_-(0) \equiv \lim_{x\to 0} \mu'(-|x|)$.

Within these properties, loss aversion is captured in properties 3 and 5; diminishing sensitivity is captured by property 4.

Total gain-loss utility in period t is now assumed to be the sum of gain-loss utilities in each dimension; i.e., $N(F_{t,\tau} \mid F_{t-1,\tau}) = \sum_{k=1}^K N^k(F_{t,\tau}^k \mid F_{t-1,\tau}^k)$.

As a last step, it is assumed that the decision maker wants to maximize the expected sum of instantaneous utilities,

$$U^t \equiv \sum_{\tau=t}^{T} u_\tau.$$

We now have all the ingredients necessary to make predictions about informational preferences. Following Kőszegi and Rabin (2009, p. 916), *information* here means information regarding "fixed but unknown future consumption." In other words, information has to be on exogenous events that cannot be influenced by the decision maker.

For simplicity, we assume that consumption takes place only in period T. Decision makers may receive information about consumption from period 1 to $T-1$. Let σ be a sequence of signals, $s_1, s_2, \ldots, s_J$, and let $t(s_j \mid \sigma)$ denote the time of arrival of signal s_j under σ.

We want to make predictions about decision makers' preferences to different information structures. For this purpose, we introduce the following terminology. We call σ' *(t_a, t_b, j)-equivalent* to σ if both involve the same sequence of signals, if in both σ and σ' only s_j and s_{j+1} arrive between t_a and t_b (with $t_b > t_a$), and if for all $i \neq j, j+1$, we have that $t(s_i \mid \sigma') = t(s_i \mid \sigma)$. Thus, if two sequences of signals are (t_a, t_b, j)-equivalent, they only differ in the timing of the two signals s_j and s_{j+1}.

The model of Kőszegi and Rabin (2009) makes the following central prediction. Clumping information is utility increasing as long as no information is delayed through clumping. This is captured in the following proposition.[30]

Proposition from Kőszegi and Rabin (2009). *Suppose that σ' is (t_a, t_b, j)-equivalent to σ and $t(s_{j+1} \mid \sigma') = t(s_j \mid \sigma') \leq t(s_j \mid \sigma) < t(s_{j+1} \mid \sigma)$. Then we have that $U(\sigma') > U(\sigma)$ for any $\gamma_{t,T} > 0$ nondecreasing in t.*

Applying this proposition to our treatments, we get that subjects strictly prefer the clumped information condition over the piecewise condition and subsequently choose to be informed in one piece in the CHOICE treatment. This can be easily shown by iteratively applying the proposition. Consider a hypothetical information sequence σ^h where subjects learn the first piece of information on Tuesday and on Wednesday learn the final outcome, i.e., whether they won or lost. Clearly, for the comparison of σ^h with the information sequence in the piecewise condition, one can see that the proposition from Kőszegi and Rabin (2009) applies, stating that subjects should strictly prefer σ^h. For the comparison of σ^h and the information sequence in the clumped condition, we can again apply their proposition, which states that subjects should strictly prefer the sequence of the clumped condition to σ^h. Therefore, subjects should strictly prefer the clumped condition over the piecewise condition and

[30] For a proof of this proposition, we refer to Kőszegi and Rabin (2009).

consequently select the clumped condition. Likewise, the average willingness to pay for the lottery should be higher in the CLUMPED treatment than in the PIECEWISE treatment.

Appendix B

Loss Aversion Without the Compound Lottery

Here, we analyze effects of individual loss aversion when constructing our measure of loss aversion differently. Disregarding the lottery choice that involves a compound lottery, we conduct our analysis of individual loss aversion with using only the choice between a fixed amount of zero and the lottery that pays three euros with a probability of 50% and *two* euros with 50% probability. We classify subjects as loss averse if they reject the lottery. We again pool observations from CHOICE, CHOICE_WEEK, CHOICE_NC, and CHOICE_DELAY treatments. For that sample, according to this measure, more than 50% of the subjects can be classified as loss averse. Focusing only on the loss-averse subjects ($N = 106$), 54% prefer information piece by piece. This percentage is actually slightly higher than the percentage from the whole sample (there, 49.8% prefer information piecewise). This pattern is confirmed by probit regressions, regressing information choice on the measure of loss aversion (see Table B.3). Thus, also when constructing individual loss aversion differently, we find no significant association with information choices.

Table B.2 Probit Regressions of Choice of Information Condition on Joint Measures of Loss Aversion and Anticipatory Emotions

	Dependent variable: *Information choice*			
	(1)	(2)	(3)	(4)
Anticipatory emotions + Loss aversion (*high or med*)	0.105	0.113		
	(0.276)	(0.273)		
Anticipatory emotions + Loss aversion (*high*)			0.088	0.112
			(0.291)	(0.297)
Controls included?	No	Yes	No	Yes
Constant	0.001	−0.017	0.037	0.009
	(0.127)	(0.117)	(0.078)	(0.086)
No. of observations	154	154	154	154
R^2	0.001	0.007	0.001	0.007

Notes. Observations from CHOICE, CHOICE_WEEK, CHOICE_NC, and CHOICE_DELAY treatments are included. Probit estimates; standard errors (in parentheses) are clustered at the session level. *Anticipatory emotions + Loss aversion* (*high or med*) is a dummy variable that is 1 if subjects are at least medium loss averse and show at least medium anticipatory emotions. *Anticipatory emotions + Loss aversion* (*high*) is a dummy variable that is 1 if subjects are highly loss averse and show high anticipatory emotions. Controls include treatment dummies.

$^*p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.1 Probit Regressions of Choice of Information Condition on Loss Aversion and Anticipatory Emotions

	Dependent variable: *Information choice* (1 = PIECEWISE)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loss aversion	−0.148	−0.145						
	(0.150)	(0.153)						
Med loss aversion			0.042	0.062				
			(0.236)	(0.0237)				
High loss aversion			0.307	0.299				
			(0.305)	(0.182)				
Anticipatory emotions					−0.046	−0.042		
					(0.034)	(0.034)		
Med anticipatory emotions							0.198	0.240
							(0.363)	(0.365)
High anticipatory emotions							−0.043	−0.005
							(0.227)	(0.223)
Controls included?	No	Yes	No	Yes	No	Yes	No	Yes
Constant	0.178	0.044	−0.097	−0.222	0.837	0.789	−0.038	−0.022
	(0.186)	(0.251)	(0.140)	(0.235)	(0.589)	(0.533)	(0.212)	(0.180)
No. of observations	197	197	197	197	166	166	166	166
R^2	0.007	0.015	0.008	0.015	0.004	0.006	0.006	0.01

Notes. Measures are included as categorical variables and also as sets of dummy variables. Observations from CHOICE, CHOICE_WEEK, CHOICE_NC, and CHOICE_DELAY treatments are included. Probit estimates; standard errors (in parentheses) are clustered at the session level. *Loss aversion* captures our three-categorical measure of loss aversion. *Med loss aversion* and *High loss aversion* are dummy variables depending on whether subjects are classified as medium or highly loss averse. *Anticipatory emotions* captures the sum of answers to the respective questions. *Med anticipatory emotions* and *High anticipatory emotions* are dummy variables reflecting medium or high degrees of anticipatory emotion, respectively. Controls include treatment dummies and a time dummy for when the experiment was conducted (if applicable).

$^*p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.3 Probit Regressions of Choice of Information Condition on Individual Loss Aversion Constructed Only from Choice That Did Not Involve a Compound Lottery

	Dependent variable: *Information choice*	
	(1)	(2)
Loss aversion	0.191	0.196
	(0.228)	(0.233)
Controls included?	No	Yes
Constant	−0.097	−0.244
	(0.140)	(0.188)
No. of observations	197	197
R^2	0.004	0.012

Notes. Observations from CHOICE, CHOICE_WEEK, CHOICE_NC, and CHOICE_DELAY treatments are included. Probit estimates; standard errors (in parentheses) are clustered at the session level. *Loss aversion* is a dummy variable constructed from the choice between a fixed payment of zero and a lottery that pays three euros with a probability of $\frac{1}{2}$ and minus two euros with a probability of $\frac{1}{2}$. Controls include treatment dummies and a time dummy for when the experiment was conducted.

$^{*}p<0.10$; $^{**}p<0.05$; $^{***}p<0.01$.

Table B.4 Linear Regressions of Willingness to Pay on Treatment Dummy and Sets of Dummy Variables for Medium and High Degrees of Both Loss Aversion and Anticipatory Emotions

	Dependent variable: *Willingness to pay*			
	(1)	(2)	(3)	(4)
Treatment dummy	1.732**	2.122***	1.680***	2.410***
	(0.686)	(0.327)	(0.042)	(0.227)
Med loss aversion	0.294	0.245		
	(0.991)	(1.122)		
High loss aversion	−0.237	0.235		
	(0.827)	(0.655)		
Med anticipatory emotions			−1.196	−2.071
			(1.327)	(1.940)
High anticipatory emotions			−0.960	−1.715
			(1.131)	(1.577)
Controls included?	No	Yes	No	Yes
Constant	26.423***	26.628***	26.910***	21.540***
	(0.727)	(0.718)	(0.747)	(2.764)
No. of observations	116	114	64	62
R^2	0.035	0.25	0.044	0.123

Notes. OLS estimates; standard errors (in parentheses) are clustered at the session level. *Treatment dummy* = 1 if PIECEWISE, 0 if CLUMPED. *Med loss aversion* and *high loss aversion* are dummy variables depending on whether subjects are classified as medium or highly loss averse. *Med anticipatory emotions* and *high anticipatory emotions* are dummy variables reflecting medium or high degrees of anticipatory emotions, respectively. Controls include gender, risk attitudes, and a time dummy for when the experiment was conducted (if applicable). For the coefficient of the treatment dummy, we test the null hypothesis that willingness to pay is greater in CLUMPED and thus provide one-sided test statistics.

$^{*}p<0.10$; $^{**}p<0.05$; $^{***}p<0.01$.

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