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Delight or disappointment? A model of signal-based other-pleasing choice

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ABSTRACT

This paper develops a discrete choice model to address the problem of an other-pleasing decision-maker (DM), who makes a choice for another individual without knowing her/his preferences and expectation. The DM's choice may delight or disappoint the other, depending on her/his expectation from the DM. The psychological utility of the other is a function of the emotion triggered by the DM's choice. The objective of the DM is to maximise the expected psychological utility of the other. In the absence of complete information, a risky choice is made by the DM, based on signals about the other's expectation that s/he receives. In terms of personality trait, the DM may be a delight-seeker, or disappointment-averse, or neutral. While a delight-seeker overweighs the other's psychological utility from delight, a disappointment-averse DM overweighs the disutility of disappointment. Based on the model, hypotheses have been constructed and tested in a gamified decision-making scenario that simulated the model conditions. In this serious game experiment, delight-seeking, disappointment-averse, and neutral behaviours were induced by use of appropriate incentivisation of the subjects in the corresponding treatment groups. Unique choice architecture has been given to subjects in each treatment group to signal the expectation of a hypothetical other, and choice decisions were observed under elicited belief. Compared to the control (neutral) group, those in delight-seeking treatment were observed to be less likely, and those in disappointment-averse more likely, to make a choice in conformity to the signal they received. Statistically significant results were obtained only when the signals were strong.

1. Introduction

In terms of personality types (Adler, 2013) a 'pleaser' loves to serve others (Mosac, 1971), and her/his thoughts are 'other-centred' (Boldt, 2007). Personality typology is a 'conceptual device to make more understandable the similarities of individuals' (Adler, 1929), and hence, a person who displays pleaser behaviour in specific circumstances is not always a pleaser (Kefir and Corsini, 1974). There is documented evidence in the academic literature, across multiple disciplines, of pleaser behaviour in making choice decisions. Many of the consumption choices, for example, buying presents, going to restaurants or movies, choosing recreational sites, or buying food at the grocery store, can be made to please others, like a spouse, a parent, a son/daughter, a friend, a family member who is a significant other, or even a professional relation, rather than the self (Ariely, 2000; Beagan and Chapman, 2004; Morey and Kritzberg, 2012). Such choices are referred to as other-pleasing in this paper.

When individuals are concerned about pleasing another individual, they attempt to make decisions that are consistent with the

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perspectives of the other if they have complete information about the other's perspectives (Kardes et al., 2014). Gift selection is possibly the most common example of other-pleasing choice when the giver wants to convey to the recipient that the relationship is valued and selects a gift that matches the recipient's preferences (Belk and Coon, 1993; Belk, 1996; Steffel and Le Boeuf, 2014). However, the pleasers sometimes must make other-pleasing choices under incomplete information about the other's preferences. Choosing a gift to initiate a relationship and to achieve relational proximity to the recipient (Belk and Coon, 1993) is a classic example of other-pleasing choice made under incomplete information. The decision-maker (DM) may however mispredict the other's preferences and expectations (Zhang and Epley, 2012; Galak et al., 2016), while attempting to make an other-pleasing choice. In the absence of complete information, the DM is required to anticipate the other's preferences.

There are choice models where the DM's utility or willingness to pay depends on the well-being of others along with her/his own (Hensher et al., 2011; Ozdemir et al., 2016; Svenningsen and Jacobsen, 2018; Elsenbroich and Payette, 2020). Other-pleasing DMs, in contrast, care only about fulfilling the expectation of the other. Surprisingly, there does not exist a discrete choice model of other-pleasing decisions made under incomplete information. The emerging literature on decision-making for others is closely related. This strand of behavioural economics research focusses primarily on decisions involving risk-taking for others, like making an investment choice, or choosing a medical intervention or career option for another individual. The dominant experimental query has been whether risk-behaviour or ambiguity attitude significantly differs while deciding for others vis-à-vis while making the same decision for self (Zikmund-Fisher et al., 2006; Füllbrunn and Luhan, 2017; Vlaev et al., 2017; Zhang et al., 2017; Xu et al., 2018). The difference (if any) may be the consequence of incomplete information regarding the other's risk-preference or ambiguity attitude.

While deciding for others, the DM takes risk due to incomplete information about the other's preferences. It might be impossible to obtain complete information about another individual even when the DM knows him/her for a long time and the relationship is a close one. Studies in social psychology (Dunning et al., 1990; Swann and Gill, 1997) and consumer behaviour (Lerouge and Warlop, 2006) observed that people overestimate what they know about their close friends and significant others. Likewise, the literature on proxy choice (Allen and Shuster, 2002; Cai et al., 2015; Turnbull et al., 2019) and proxy response (Beck et al., 2012; Seebauer et al., 2017; Maruyama et al., 2021) highlights the fact that people do not know the preferences of their close relations and/or household members. Hence, when they must choose for a family member, they encounter a situation of decision-making for another individual without complete information about the other's preference and expectation. For decisions like medical intervention or school/career choice, the other may not be able to express her/his preference and expectation when the decision is made, but ex-post there might be a mismatch. For incapacitated patients, familial proxies make decisions based on inaccurate information about the patient's wishes (Allen-Burge and Haley, 1997). Incompleteness of information may prevail even when a joint consumption decision (like choosing a restaurant or holiday destination) is made through a discussion, wherein the partner who first proposes a choice takes the risk of decision-making under incomplete information about the other's preference and expectation. This is so because the other might accept the proposal to avoid disappointing the proposer, even if the proposed choice is not her/his most preferred one. This paper develops a model of other-pleasing choice under incomplete information about the other's preferences, accounting for the possibility of expectation mismatch.

Ex-post, the choice made by the DM (who will be referred to by the pronoun 'she') may or may not match with the preferred alternative of the other (referred by the pronoun 'he'). If the choice made by the DM does not match with the other's preference, then it not only results in loss of material utility derived by the other from consuming the good/service, but also affects his psychological utility, which is a function of the emotional state (like delight or disappointment). According to 'decision affect theory' (Mellers et al., 1997), emotional response is triggered by unexpected outcome. If the other expects the DM to choose the alternative that is not preferred by him, but she makes the choice in accordance with his preference, then the other gets delighted by the surprise and thereby receives a positive psychological utility. However, if the other expects the DM to make the choice in accordance with his preference, but she chooses the alternative that is not preferred by him, then the other receives a negative psychological utility due to disappointment. The expectation of the other depends on his belief about what the DM may choose. The other-pleasing DM is strategic as her sole objective is to maximise the expected psychological utility of the other. Since the DM does not know the other's belief, she is required to form a second-order belief about the belief of the other. The DM is delight-seeking if she cares more about the other's utility gain because of the delight and is disappointment-averse if she cares more about the other's utility loss due to a disappointment. This paper models a choice decision based on the DM's belief about the other's expectation. The framework of 'psychological game theory' (Geanakoplos et al., 1989; Battigalli & Dufwenberg, 2007, 2009) has been utilised to incorporate the second-order belief of the DM in the analysis. The second-order belief may be formed based on an exogenous signal (Khalmetski et al., 2015). The DM may derive signals about the other's expectation from her past interactions with him, and/or from her past interactions with other individuals for whom she has made choice decisions. Notably, past interactions help the DM in obtaining only noisy signals, and not definite information. The strength of the signal depends on the frequency of disappointment/delight observed by the DM in her past interactions. Considering that the second-order belief is formed based on an exogenous signal, the analytical model develops the hypotheses of this paper that a delight-seeker (disappointment-averse) is less (more) likely to conform to the signals. This is an important result in choice modelling, as it tells us how a DM might use available signals while choosing for others under incomplete information about the other's preferences, and in absence of any self-interest. The general nature of the model makes it applicable in several areas, which is discussed in Section 5.

A serious game (SG) experiment (Villalobos, 2007; Vos, 2015; Katsaliaki and Mustafee, 2015; Rumore et al., 2016; Gordon and Yiannakoulias, 2020) has been designed to test the hypotheses. In the context of moral choice behaviour, Chorus (2015) noted the usefulness of SG experiments in studying how an individual's behaviour influences and is influenced by others, as this approach helps the researcher in controlling the behaviours, perceptions, and expectations of the participants to some extent. The purpose of the SG experiment is to study the choice behaviour of the DM under incomplete information, and to observe if there is any significant difference between the behaviour of delight-seeking and disappointment-averse DMs, in response to the same set of signals. However, it must be noted that this study does not intend to identify the prevalence of delight-seeking and disappointment-averse personality traits in the sample of subjects. Identifying the determinants of these personality traits is not within the scope of this study. The SG approach is conducive for inducing the subjects to emulate the other-pleasing DM's behaviour under incomplete information, through use of appropriate incentives. Delight-seeking behaviour was induced on one treatment group, disappointment-aversion on another group, and neutrality (that is, neither delight-seeking nor disappointment-averse) was induced in the control group. The subjects were given vignettes about a hypothetical 'other' for whom they were required to make a decision. Within a treatment group, each subject was given a unique choice architecture that signalled to them the other's expectation. Signals received by different participants varied in strength, which was controlled through the choice architecture. The mechanism has been elaborated in Section 3.1. Experimental observations reveal that the participants in the delight-seeking (disappointment-averse) treatment were significantly less (more) likely to conform to the signal, in comparison to the control group, only when the signals were strong.

The rest of the paper is organised as follows. Section 2 develops the analytical model. The experiment design is discussed in Section 3, followed by data analysis and result presentation in Section 4. The methods and results are discussed with respect to the literature in Section 5, and the final section is dedicated to drawing conclusions.

2. Analytical model

This model analyses the choice decision of an individual A (DM, she) when the decision is made to please another individual B (other, he). The choice problem for A is a binary one, that is A must choose between two options, X and Y. The two options are comparable. For example, if it is a summer holiday choice, for a given number of days at a given budget, and the options are a hiking trip and a beach holiday.

Types of individuals. There are two types of individuals in the population in terms of their preferences, type-X and type-Y. If an individual prefers option X over option Y, then s/he is classified as type-X individual, and otherwise as a type-Y individual. B may be of either type, i.e. $B \in \{B_X, B_Y\}$. In the context of the holiday choice example stated above, if option X is hiking and option Y is a beach holiday, then type-X would refer to people who enjoy hiking and type-Y to the beach lovers.

This 2x2 model (2 options, 2 types) is simple but captures the issue of expectation mismatch and the resulting emotional states (disappointment/delight), which is the focal point of this choice model.

A's belief. A does not know the type of B but forms a first-order belief on his type. Individual A believes that individual B is B_X with probability θ, and is B_Y with probability $(1-\theta)$.

B's belief. B forms a first-order belief about the mixed strategy of A (Battigalli and Dufwenberg, 2009). $B_i (i = X, Y)$ believes that the option i will be chosen with probability μ_i and option j will be chosen with probability $(1-\mu_i)$. In a symmetric case $\mu_X = \mu_Y$. But it is possible that $\mu_X \neq \mu_Y$, i.e. the probability with which B_X believes that the option X will be chosen is not same as the probability with which B_Y believes that the option Y will be chosen.

A's second-order belief. A does not know B's first-order belief about A's mixed strategy but forms a belief about B's belief. Based on her second-order belief, $\widetilde{\mu}_i$ is A's expectation of μ_i. Rabin (1993) is the pioneering work that used second-order belief of players to construct a fairness equilibrium.

2.1. Expected utilities

A makes a choice to please B. After the choice is made, B gets a material utility as well as a psychological utility. Since A is altruistic, only B's utility matters for her. B's psychological utility depends on B's first-order belief, and hence A's decision depends on A's belief about B's type as well as on her second-order belief about B's belief. The structure of the decision-making process is like the 'bravery game' of Geanakoplos et al. (1989).

B's utility function has two components, material and psychological.

B's material utility. An individual of type i obtains positive material utility $V (V > 0)$ from option i. Since the options are comparable, it is reasonable to assume that the material utility obtained by a type-X individual from option X is the same as the material utility obtained by a type-Y individual from option Y. However, an individual of type i does not obtain any material utility $V (V > 0)$ from option i. Therefore, the material utility of B_i from the DM's choice is V if option i gets chosen and is 0 if option j gets chosen.

B's psychological utility. B's psychological utility depends on the emotion (delight/disappointment) that A's choice might trigger. Such emotion is triggered only if the choice surprises B due to deviation from his expectation (Mellers et al., 1997). $B_i (i = X, Y)$, who is a type-i individual and prefers option i, gets delighted by positive surprise if he expects A to choose option j and A chooses option i. On the contrary, if B_i expects A to choose option i and A chooses option j, then he gets disappointed due to the negative surprise. However, if B_i expects that A will choose option i and A chooses option i, then B's psychological utility is 0 because he does not get disappointed nor is delighted. Let λ be the magnitude of delight, which is added when B is positively surprised, and δ be the magnitude of disappointment which is subtracted when B is disappointed.

B's expected utility. If A chooses option i, then B_i gets material utility V. Moreover, he gets the psychological utility λ due to delight with probability $(1-\mu_i)$, as he expected A to choose option j with probability $(1-\mu_i)$. Therefore, the expected utility of B_i when A chooses option i is $U^i_{Bi} = V + (1-\mu_i)\lambda$. On the other hand, if A chooses option j, then B_i does not get any material utility. Moreover, he gets the psychological disutility -δ due to disappointment with probability μ_i, as he expected A to choose option i with probability μ_i. Therefore, the expected utility of B_i when A chooses option j is, $U^j_{Bi} = -\mu_i\delta$.

A's objective is to maximise B's expected psychological utility. A does not know the values of B's delight (λ) and disappointment (δ). Instead, she makes the decision based on her perceived values of λ and δ, which are $\widetilde{\lambda}$ and $\widetilde{\delta}$. While $\widetilde{\lambda}$ characterises the delight-seeking attitude of A, her disappointment-aversion is characterised by $\widetilde{\delta}$. A perceived higher value of $\widetilde{\lambda}$ makes A delight-seeking and a higher value of $\widetilde{\delta}$ makes her disappointment-averse. A is defined as delight-seeking if $\widetilde{\lambda} > \widetilde{\delta}$, as neutral if $\widetilde{\lambda} = \widetilde{\delta}$, and as disappointment-averse if $\widetilde{\lambda} < \widetilde{\delta}$. This specification allows asymmetry in the model. Since, A does not know μ_i, which is B's belief, she must use her belief about B's belief, which is referred to as her second-order belief, to form an expectation of μ_i. Let $\widetilde{\mu}_i$ be A's expectation of $\mu_{i,}$ formed by her second-order belief.

A's expected utility. If B is type-X the expected utility of A from choosing option X is

$$U_A^{XX} = \left(1 - \widetilde{\mu}_X\right)\widetilde{\lambda} \tag{1}$$

and that from choosing option Y is

$$U_A^{YX} = -\widetilde{\mu}_X\widetilde{\delta} \tag{2}$$

Similarly, if B is type-Y the expected utility of A from choosing option X is

$$U_A^{XY} = -\widetilde{\mu}_Y\widetilde{\delta} \tag{3}$$

and that from choosing option Y is

$$U_A^{YY} = \left(1 - \widetilde{\mu}_Y\right)\widetilde{\lambda} \tag{4}$$

2.2. Equilibrium choices and hypotheses

In psychological games, belief consistency is required at equilibrium (Geanakoplos et al., 1989; Battigalli & Dufwenberg 2007, 2009). However, various experiments rejected belief consistency. In Khalmetski et al. (2015), second-order belief is formed by an exogenous signal, such that the second-order belief conditional on a stronger signal first-order stochastically dominates the second-order belief conditional on a weaker signal. A similar characterisation of second-order belief has been adopted here. Let $F(\mu_i|\tau)$ be the conditional cumulative distribution function of μ_i, for a signal τ, where $\mu_i \in (0,1)$. If τ'' is a stronger signal than τ', i.e., if $\tau'' > \tau'$, then $F(\mu_i|\tau'') < F(\mu_i|\tau')$. A's expectation of μ_i is, $\widetilde{\mu}_i = E(\mu_i|\tau_i)$.

A chooses under incomplete information about the type of B. She believes that B is B_X with probability θ, and is B_Y with probability $(1-\theta)$. Therefore, the expected utility of A from choosing option X is $EU_A^X = \theta(1-\widetilde{\mu}_X)\widetilde{\lambda} - (1-\theta)\widetilde{\mu}_Y\widetilde{\delta}$.

$$\text{Rewriting,} \quad EU_A^X = \theta[1 - E(\mu_X|\tau_X)]\widetilde{\lambda} - (1-\theta)E(\mu_Y|\tau_Y)\widetilde{\delta}. \tag{5}$$

The expected utility of A from choosing option Y is $EU_A^Y = (1-\theta)(1-\widetilde{\mu}_Y)\widetilde{\lambda} - \theta\widetilde{\mu}_X\widetilde{\delta}$.

$$\text{Rewriting,} \quad EU_A^Y = (1-\theta)[1 - E(\mu_Y|\tau_Y)]\widetilde{\lambda} - \theta E(\mu_X|\tau_X)\widetilde{\delta}. \tag{6}$$

Let the cost of the option X and option Y be the same for A. Therefore, A will choose the option that maximises her expected utility.

Let $\theta = \theta^*$ be the threshold first-order belief about B's type that makes A indifferent between choosing option X and option Y, i.e., at $\theta = \theta^*$, $\mathrm{EU}_A^X = \mathrm{EU}_A^Y$.

Substituting from equations (5) and (6) in the above condition,

$$\theta^*\left[1 - E(\mu_X|\tau_X)]\widetilde{\lambda} - (1-\theta^*)E(\mu_Y|\tau_Y\right)\widetilde{\delta} = (1-\theta^*)\left[1 - E(\mu_Y|\tau_Y)]\widetilde{\lambda} - \theta^* E(\mu_X|\tau_X\right)\widetilde{\delta} \tag{7}$$

Proposition 1. *If $\widetilde{\lambda} = \widetilde{\delta}$, i.e., if A is neither delight-seeking nor disappointment-averse, then $\theta^* = \frac{1}{2}$.*

Proof: Substituting $\widetilde{\lambda} = \widetilde{\delta}$ in (7) and rearranging,

$$\widetilde{\lambda}(1-2\theta^*) = 0 \text{ or } \theta^* = \frac{1}{2} -$$

A chooses the option X if $\theta > 0.5$, that is the threshold first-order belief is independent of her second-order belief on B's first-order belief about her mixed strategy. It also means that A's choice is independent of her second-order belief, and hence is independent of the signal she receives, if she is neutral.

Proposition 2. *If $\widetilde{\lambda} > \widetilde{\delta}$, i.e., if A is relatively more delight-seeking, then, θ^* increases with increase in $E(\mu_X|\tau_X)$ and decreases with increase in $E(\mu_Y|\tau_Y)$.*

Proof: Rearranging (7) may be written as

$$\left(\widetilde{\lambda}-\widetilde{\delta}\right)[(1-\theta^{*})E(\mu_Y|\tau_Y)-\theta^{*}E(\mu_X|\tau_X)]=\widetilde{\lambda}(1-2\theta^{*})$$

$$\text{or}\quad \theta^{*}=\frac{\widetilde{\lambda}-\left(\widetilde{\lambda}-\widetilde{\delta}\right)E(\mu_Y|\tau_Y)}{2\widetilde{\lambda}-\left(\widetilde{\lambda}-\widetilde{\delta}\right)[E(\mu_X|\tau_X)+E(\mu_Y|\tau_Y)]}. \tag{8}$$

It follows from (8) that θ^{*} increases with an increase in $E(\mu_X|\tau_X)$ and decreases with increase in $E(\mu_Y|\tau_Y)$.•

Corollary to Proposition 2: When $\widetilde{\lambda}>\widetilde{\delta}$, i.e. when A is relatively more delight-seeking, then $\theta^{*}\geq\frac{1}{2}$, if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}\geq 1$, and $\theta^{*}<\frac{1}{2}$, if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}<1$.

(Proof is given in Appendix 1.)

A chooses the option X if $\theta>\theta^{*}$. If the threshold belief θ^{*} increases (decreases), the likelihood of A choosing option X decreases (increases) and that of choosing option Y increases (decreases). If A is neutral, that is neither delight-seeking nor disappointment-averse, then $\theta^{*}=\frac{1}{2}$ (Proposition 1). However, if A is relatively more delight-seeking then, compared to a neutral DM, she is less likely to choose option X (and more likely to choose option Y) if, $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}>1$. Conversely, if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}<1$, she is more likely to choose option X (and less likely to choose option Y). Thus, the following hypothesis is arrived at.

H1. *Compared to a neutral DM, the odds of making the choice decision in conformity to signal is lower for a delight-seeker.*

If the DM is a delight-seeker, she will want to choose what the other does not expect her to choose.

Proposition 3. *If $\widetilde{\lambda}<\widetilde{\delta}$, i.e., A is relatively more disappointment-averse, then θ^{*} decreases with increase in $E(\mu_X|\tau_X)$ and increases with increase in $E(\mu_Y|\tau_Y)$.*

Proof: Rearranging (7) can be written as

$$\left(\widetilde{\delta}-\widetilde{\lambda}\right)[\theta^{*}E(\mu_X|\tau_X)-(1-\theta^{*})E(\mu_Y|\tau_Y)]=\widetilde{\lambda}(1-2\theta^{*})$$

$$\text{or}\quad \theta^{*}=\frac{\widetilde{\lambda}+\left(\widetilde{\delta}-\widetilde{\lambda}\right)E(\mu_Y|\tau_Y)}{\left(\widetilde{\delta}-\widetilde{\lambda}\right)[E(\mu_X|\tau_X)+E(\mu_Y|\tau_Y)]+2\widetilde{\lambda}}. \tag{9}$$

It follows from (9) that θ^{*} decreases with increase in $E(\mu_X|\tau_X)$ and increases with increase in $E(\mu_Y|\tau_Y)$.•

Corollary to Proposition 3: When $\widetilde{\lambda}<\widetilde{\delta}$, i.e., when A is relatively more disappointment-averse, then $\theta^{*}\leq\frac{1}{2}$, if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}\geq 1$, and $\theta^{*}>\frac{1}{2}$, if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}<1$.

(Proof is given in Appendix 1.)

Compared to a neutral DM, a disappointment-averse DM is more likely to choose option X (and less likely to choose option Y) if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}>1$, and is less likely to choose option X (and more likely to choose option Y) if $\frac{E(\mu_X|\tau_X)}{E(\mu_Y|\tau_Y)}<1$. Thus, the following hypothesis is arrived at.

H2. *Compared to a neutral DM, the odds of making the choice decision in conformity to signal is higher for a disappointment-averse one.*

When the DM is disappointment-averse, she would want to choose what the other expects her to choose.

3. Experimental study

The objective of this study is to test the hypotheses *H1* and *H2*, developed in Section 2. Specifically, the intent is to see if the likelihood of making the decision in conformity to the signal significantly differs between delight-seekers and disappointment-averse individuals. Given this intent, it is necessary to simulate a controlled scenario similar to the decision-making scenario of an other-pleasing DM who makes a choice decision, based on some signal about the other's expectation, but without knowing the other's preference. A SG experiment was used because it is possible to control the behaviour of the subjects by designing a suitably incentivised game. The subjects were required to make choice decisions for a hypothetical individual and were rewarded/penalised for the decisions they made. Delight-seeking and disappointment-averse behaviour have been emulated through control of rewards/penalties, which acted as the proxy for the psychological utility of the other.

The experiment was conducted on postgraduate students of management at XLRI-Xavier School of Management, which is a premier business school in India. At the time of the experiment, the postgraduate program just commenced, and hence cannot have any effect on their decision-making. At the undergraduate level, 73.66% of the subjects studied engineering or technology, and the rest studied business, economics, or science. The average age of the subjects was 23.73 years, while the minimum and maximum ages were 20 years and 28 years, respectively. Of the subjects, 39.25% were female.

3.1. Design and implementation

A between-subjects design was employed to observe the effect of signals on the subjects' decisions. The subjects were given a vignette containing a choice architecture. According to the vignette, a hypothetical individual ('other') has been randomly drawn from a population and paired up with the subject. The population consists of two kinds of individuals in terms of their preferences among two available alternatives: X and Y. Those who prefer X over Y are X-type, and those who prefer Y over X are Y-type. The 'other' has made a choice for herself/himself and has made a prediction about the chances that the subject will make the same choice as her/him. The prediction represents the belief of the 'other' about whether the subject will make the same choice as her/him. The subjects were provided with a pair of frequency distributions of belief among X-type and Y-type individuals in the population, as the only signal about the 'other's belief. They were required to choose for the 'other', based on this signal, but without knowing the 'other's choice (and hence, preference) and belief. The subjects were told that X and Y represent two contrasting preferential attributes, but they were not told what those attributes are. Past experiments have shown that the decision for others gets influenced by the DM's preferences, biases, or interests (Kenny and Acitelli, 2001; Carlsson et al., 2010). Abstract options were used in the vignette to avoid such contamination.

A total of 186 subjects were equally divided into three treatment groups, including the control group. Three different payoff structures were given in the three treatments to induce (i) neutral (in the control group), (ii) delight-seeking, and (iii) disappointment-averse behaviour. The payoff of the subjects depended on whether their choice matched with that of the 'other' and on the prediction by the 'other'. Subject's payoff was:

$$\Pi = \begin{cases} F + (1-P)\lambda, & \text{if the choice matches with the 'other'} \\ F - P\gamma, & \text{if the choice does not match with the 'other'} \end{cases}$$

F is the participation fee and P is the chance of choice matching predicted by the 'other'. While F was fixed at 60 Rupees[1] for all subjects across treatments, λ and γ varied across treatments. In the control group (neutral), $\lambda = \gamma$ was set at 40 Rupees. In the delight-seeking treatment, $\lambda > \gamma$ was used to induce delight-seeking behaviour. λ was set at 60 Rupees and γ at 20 Rupees. In the disappointment-averse treatment, $\lambda < \gamma$ was used to induce disappointment-averse behaviour. λ was set at 20 Rupees and γ at 60 Rupees. The subject's payoff that was added to the participation fee corresponded to the expected payoffs given in (1) and (4). Likewise, the payoff that was subtracted from the participation fee corresponded to the expected payoffs given in (2) and (3). P represented the 'other's first-order belief about the subject's mixed strategy. The subject was required to form a second-order belief based on the distributions provided to her/him.

The instructions given to subjects in different treatment groups specified the payoff determination of the treatment. Otherwise, the instructions were the same. Each subject within a treatment group was given a different pair of frequency distributions of predictions, which was the signal about the 'other's first-order belief. The pair of frequency distributions of prediction was given in the subject's response sheet. The response sheets were distributed among the subjects by a draw of folded chits containing the identity (ID) number of the response sheets. An instruction sheet for the delight-seeking treatment and a representative response sheet is given in Appendix 2. The subjects were asked to make decisions in 19 different decision-making situations wherein the share of X-type and Y-type individuals varied in the population from which the 'other' has been drawn. This manipulation was done to elicit the subject's threshold first-order belief for switching choice. The sets of X-type and Y-type individuals were referred to as X-group and Y-group in the instructions sheet and response sheet.

A total of 62 different pairs of frequency distributions of predictions were generated and were used in all three treatments. This was done to ensure that the treatments were identical except for their payoff structures. In each treatment group, 28 subjects were provided with strong signals having highly skewed distributions. Among these 28 subjects, 14 got highly left-skewed distribution for X-group and right-skewed distribution for Y-group, and the remaining 14 subjects got the opposite. In each treatment group, 34 subjects were provided with weak signals having less skewed or nearly symmetric distributions. However, even among these 34 subjects, 17 got mildly left-skewed distribution for X-group and right-skewed distribution for Y-group, and the remaining 17 subjects got the opposite. The ratio of mean-P for X-group to that for Y-group indicates the nature of the signal as well as provides a measure of the signal strength. For convenience, let us denote the signal as X-signal if the ratio is greater than 1 and as Y-signal if the ratio is less than 1. In each treatment group, 31 subjects were given X-signals and the remaining 31 were given Y-signals. Out of the 31 X-signals, 14 had the ratio of mean-P for X-group to that for Y-group in the interval [1.28, 1.59]. These 14 signals were classified as strong X-signals. The remaining 17 had the ratio in the interval [1.02, 1.24] and were classified as weak X-signals. Likewise, among the 31 Y-signals, there were 14 strong Y-signals having the ratio of mean-P for Y-group to that for X-group in the interval [1.28, 1.59] and 17 weak Y-signals having that ratio in the interval [1.02, 1.24]. Table 1 summarises the distribution of signals among the subjects in each treatment.

The instructions were read aloud, and the subjects were instructed to read along. The subjects had to take a short quiz to test their understanding of payoff determination. After all the queries were addressed, the subjects were given 10 min to make their decisions. The 'choice' and the 'prediction' of the 'other' corresponding to each subject was required for determination of the subjects' payoffs. For each subject, the 'choice' of the 'other' and her/his 'prediction' was determined by means of random experiments maintaining the same probabilities as given in the scenario.

A random lottery was used to select one of the 19 decisions made by the subject for her/his payoff determination. To determine the 'other's 'choice', the subject was asked to make another random draw from a basket corresponding to the decision drawn for payoff determination. There were 19 baskets corresponding to each of the 19 decision-numbers given in the subjects' response sheets. Each basket contained 100 colour-coded tokens, with two different colours representing X and Y. The shares of tokens in the basket were the

[1] Rs. 60 = 0.8 EUR. But purchasing power of 1 EUR in India is approximately equal to that of 3.8 EUR in Western Europe. So, Rs. 60 in India is equivalent to 3 EUR, in terms of purchasing power.

Table 1
Signals given to the subjects.

	Signal strength		
	Strong signal	Weak signal	Total
X-signal	14	17	31
Y-signal	14	17	31
Total	28	34	62

same as the shares of X-group and Y-group in the population corresponding to the decision-number. Finally, the subject had to perform another random draw of folded chits to determine the 'prediction' of the 'other'. For each pair of the frequency distribution of predictions, a pair of boxes denoted as box-X and box-Y were created. Each box contained 100 folded chits, each containing one of the ten categories of prediction. The number of chits belonging to each category, kept in the box, was equal to the frequency of that category. The X-group frequency distribution was used for box-X and the Y-group frequency distribution was used for box-Y. If the 'choice' of the 'other' (determined through the preceding token draw) turned out to be X, then the subject was asked to perform a draw from box-X. If the 'choice' turned out to be Y, then the subject was asked to perform the draw from box-Y. This process of payoff determination through random experiments was explained to the subjects beforehand.

3.2. Data

A total of 186 subjects made 19 decisions each, generating a total of 3,534 decisions.[2] The demographic data were collected from the students' record of the school where the experiment was conducted. For each subject, in each treatment, the following data were recorded apart from the demographic data.

(i) **Threshold proportion for switching**: The upper limit of the proportion of X-type in the population (from which the 'other' was drawn) for which the subject's choice decision was Y.
(ii) **Decision when the proportion of X is 0.5**: The subject's choice decision if the share of X-type in the population is 0.5.
(iii) **Decision-number that was chosen for the payoff determination**: Out of 19 decisions made by the subject, the decision that was chosen (by means of the random draw) for payoff determination.
(iv) **Decision of the subject**: The subject's choice decision (X or Y) at the decision chosen for payoff determination.
(v) **Choice of the 'other'**: 'choice' of the 'other' determined by means of the random experiment.
(vi) **Prediction of the 'other'**: 'prediction' of the 'other' determined by means of the random experiment.
(vii) **P**: The mid-value of the category for the 'prediction' of the 'other' determined by means of the random experiment.
(viii) **Payoff**: Payoff (in Rupees) given to the subject.

4. Results

Correlations were run between the mean-*P* of the X-group frequency distribution and threshold belief, separately for each treatment. Similarly, correlations were run between the mean-*P* of the Y-group frequency distribution and the threshold belief. The results are summarised in Table 2. In the delight-seeking treatment, the threshold belief is positively correlated with the mean-*P* of X-group distribution and is negatively correlated with the mean-*P* of Y-group distribution. This directly supports Proposition 2. In contrast to this, the threshold belief is positively correlated with the mean-*P* of Y-group distribution and is negatively correlated with the mean-*P* of X-group distribution in the disappointment-averse treatment. This result supports Proposition 3. In the neutral treatment (control), the threshold belief is positively correlated with the mean-*P* of Y-group distribution and is negatively correlated with the mean-*P* of X-group distribution. But the coefficients indicate weak correlations.

If a subject chose X after receiving X-signal, or chose Y after receiving Y-signal, then her/his decision is classified as 'signal-conforming'. In contrast, if a subject chose Y after receiving X-signal, or chose X after receiving Y-signal, then her/his decision is classified as 'signal-contrary'. Frequency (percent) of observations where the decision was 'signal-conforming' and of observations where the decision was 'signal-contrary', for strong signals and for weak signals, for three different treatments, are summarised in Table 3. For ease of comparison, the frequency distribution of observations summarised in the 3-way table (Table 3) is also presented in Fig. 1.

In comparison to the control group (neutral treatment), the frequency of 'signal-conforming' decisions is less in delight-seeking treatment and is more in disappointment-averse treatment. In contrast, the frequency of 'signal-contrary' decisions is more in delight-seeking treatment and is less in disappointment-averse treatment. The result is starker when the signals given to the subjects were strong, vis-à-vis when the subjects received weak signals. The frequency distributions of observed decisions validate the hypotheses *H1* and *H2*.

Binary logistic regressions were run taking the observed decision as the dependent variable and the treatment as the covariate. This has been done to verify if the findings are statistically significant. In the binary logistic regression, the dependent variable was decision (D), where $D_i = 1$ if the decision is 'signal-conforming', and $D_i = 0$ if the decision is 'signal-contrary', that is the reference category for D

[2] The data set is available at https://data.mendeley.com/datasets/bcw4n67dcb/1.

Table 2
Coefficients of correlation between threshold belief and mean-*P* of the distributions given to subjects.

	Neutral	Delight-seeking	Disappointment-averse
X-group distribution	−0.000960	0.479512	−0.701710
Y-group distribution	0.095201	−0.522560	0.470034

Table 3
3-way table of frequency of observed decisions.

	Strong signal		Weak signal	
Treatment	Decision	Frequency (%)	Decision	Frequency (%)
Neutral	conforming to signal	53.57	conforming to signal	50.00
	contrary to signal	46.43	contrary to signal	50.00
Delight-seeking	conforming to signal	21.43	conforming to signal	35.29
	contrary to signal	78.57	contrary to signal	64.71
Disappointment-averse	conforming to signal	78.57	conforming to signal	67.65
	contrary to signal	21.43	contrary to signal	32.35

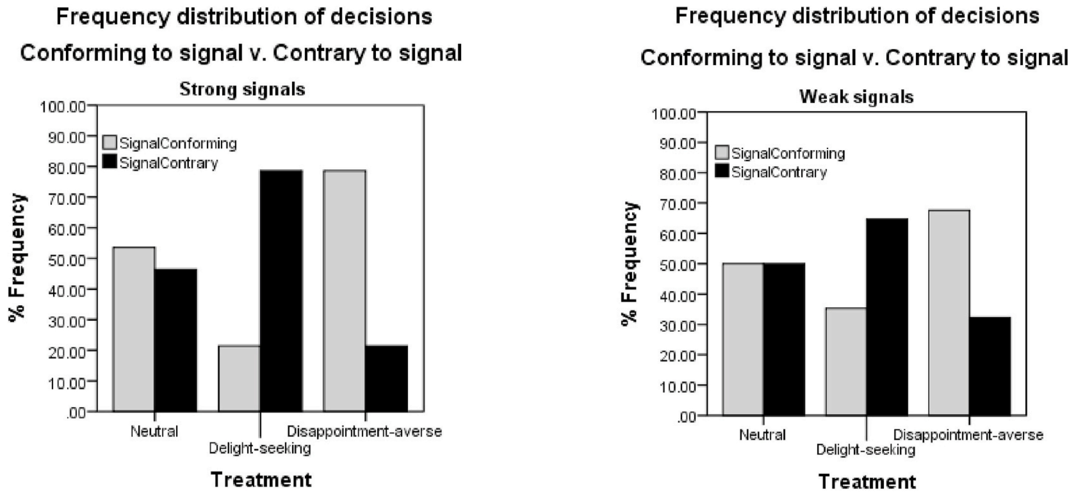

Fig. 1. Frequency distribution of observed decisions.

was 'signal-contrary'. The covariate was treatment (T), with control group as the reference, that is $T_i = 0$ if the treatment given is neutral, and $T_i = 1$ if the treatment given is delight-seeking, or disappointment-averse, depending on the model. The following model was used:

$$\pi_i = \Pr(D_i = 1 | T_i = 1) = \frac{Exp[\beta_0 + \beta_1 T_i]}{1 + Exp[\beta_0 + \beta_1 T_i]}$$

$$\text{or} \quad logit(\pi_i) = \beta_0 + \beta_1 T_i.$$

Separate regressions were run on observations where the subjects received strong signals and on observations where they received weak signals. The regression coefficients (β), the Wald statistic, p-values, and the odds ratios ($Exp[\beta]$) are given in Table 4 and Table 5.

In the case of the strong signals, the omnibus test of the model generated a χ^2 value 19.535 and p-value 0.00, while in the case of the weak signals the χ^2 and p-value are 7.247 and 0.026 respectively. This result indicates that treatment explains the observed decision in both cases, but the explanatory power is more in the case of the strong signals. The model correctly classified 70.2% cases when the signals were strong and 60.8% cases when the signals were weak. Hosmer-Lemeshow test generated the p-value 1.00, indicating that the model is a perfect fit to the data.[3] A comparison of the p-values reported in Tables 4 and 5 indicates that the Wald statistics are significant in the case of the strong signals, but not in the case of the weak signals. The odds ratios indicate that in comparison to the control group, the likelihood of making a 'signal-conforming' decision is less in the delight-seeking treatment and more in the disappointment-averse treatment. The results of the binary logistic regressions further reinforce the validity of *H1* and *H2*.

[3] All supplementary test results are available from the authors.

Table 4
Results - logistic regression (Strong signals).

Covariates	Coefficients (β)	Std. Error	Wald statistic	p-value	Odds ratio (Exp[β])
Treatment			15.999	0.000	
Delight-seeking	−1.442	0.596	5.849	0.016	0.236
Disappointment-averse	1.156	0.596	3.758	0.053	3.178
Constant	0.143	0.379	0.143	0.706	1.154

Table 5
Results - logistic regression (Weak signals).

Covariates	Coefficients (β)	Std. Error	Wald statistic	p-value	Odds ratio (Exp[β])
Treatment			6.875	0.032	
Delight-seeking	−0.606	0.496	1.491	0.222	0.545
Disappointment-averse	0.738	0.502	2.159	0.142	2.091
Constant	0.000	0.343	0.000	1.000	1.000

5. Discussion

This paper develops a discrete choice model to address the problem of a purely other-pleasing DM, who must make a choice for another individual without knowing his preferences and expectation. The objective of the DM is to maximise the expected psychological utility of the other, which depends on the emotion triggered by the DM's choice. Going by the 'decision affect theory' (Mellers et al., 1997), the model considers that emotions are triggered by unexpected choices. The other gets delighted (disappointed) if the DM chooses (fails to choose) the option he prefers, contrary to his expectation. By personality trait, the DM may be a delight-seeker, or disappointment-averse, or neutral. She makes the choice based on signals about the other's expectation. The objective of this research is to study how different personality traits use the signals in decision-making.

In a real-world context, multiple factors affect the decision, and the DM may have multiple objectives. Hence, it is difficult to isolate the effect of one specific factor on one specific objective. However, a scientific inquiry demands such isolation, to detect causal relations. In view of this, the analytical model has been developed to isolate the effect of signals on the decision-making behaviour of different personality traits, considering that the only objective of the DM is to maximise the psychological utility of the other. The stylised decision-making scenario of the model has been simulated in the SG experiment. The rationale for this method is discussed below.

The 2x2 analytical model (2 options, 2 types) developed in this paper is simple and tractable but captures the idea that disappointment/delight stemming from expectation mismatch affects the psychological utility of the other. Extending the model to 3 alternatives results in 6 different preference orderings, and hence, requires consideration of 6 types, one for each preference ordering. Consequently, the belief system also gets complicated as it will no longer be a Bernoulli (binary) distribution. Moreover, the existence of a middle alternative results in varying degrees of disappointment/delight for different types. The complexity of the model increases manifolds with increasing number of alternatives. While allowing non-binary choice and consideration of more than two types make the model more realistic, it might become intractable or mathematically dense.

However, mathematical simplicity is not the only reason for developing a binary choice model. If the choice model was non-binary, then the fundamental insights of the analytical model could have been lost in the experimental study due to interference by other factors like 'compromise effect' (Simonson, 1989; Simonson and Tversky, 1992) or 'variety seeking' tendencies (Choi et al., 2006). If the subjects were given three alternatives, they could have chosen the middle alternative due to the compromise effect. Chang et al. (2012) showed that subjects choose the middle alternative to avoid regret, while choosing for others. Restricting the choice set to a binary eliminated the possible interference of the compromise effect in the experiment. Choi et al. (2006) found that subjects exhibit greater variety-seeking tendencies while choosing for others, in comparison to while they choose for themselves. Uncertainty about the other's preferences might cause such tendencies, as variety helps in diversifying risk. Influence of such variety-seeking behaviour of the subjects on experiment outcome has been eliminated by restricting the subjects' choice set to a binary.

In the SG experiment, the subjects had to make decisions in an environment that was free of any context. This step was taken to neutralise the impact of the subject's own preferences and biases. Kenny and Acitelli (2001) found that people used their own attributes more than actual information about their partners in predicting their partner's preferences. Not having any context in the decision-making environment eliminated such potential 'confirmation biases' of the subjects.

Analytically, the model arrives at the hypotheses that a delight-seeking (disappointment-averse) DM is less (more) likely to conform to the signals, compared to a neutral one. Since the model abstracts away from any specific context, the hypotheses are also context-independent. Hence, they were tested in an environment that simulates the model scenario.

As per the model, the only objective of the DM is to maximise the psychological utility of the other. However, subjects participate in experiments in exchange for participation fees and additional incentives. Since the subjects' self-interest is likely to distort the purely altruistic objective, they were not given a context of altruistically motivated decision-making. Instead, the simulated scenario was gamified.

To experimentally test the hypotheses, it is necessary to statistically observe if there is any significant difference between different personality traits, in terms of the likelihood of making signal-conforming decisions. Therefore, a sufficiently large number of data points are required for each of the three personality traits: delight-seeking, disappointment-averse, and neutral. But neutrality is not a natural trait. So, the behaviours of different personality traits had to be induced in different treatment groups by a reward structure. The subjects of the SG experiment were given monetary reward/penalty, which acted as proxy for the psychological utility/disutility. The incentive structure in the experiment was designed following the analytical model. Since a delight-seeker overweighs the psychological utility from delight, in the delight-seeking treatment the monetary reward given to the subjects for matching their choice with the 'other' was greater in magnitude than the monetary penalty for failing to match. It was the other way around in the disappointment-averse treatment since a disappointment-averse DM overweighs the psychological disutility from disappointment.

The subjects were provided with a paired frequency distribution of beliefs in the population from which the hypothetical 'other' was drawn. This instrument acted as the choice architecture and enabled the subjects to use it as a signal of the 'other's belief and, hence, expectation. Manipulating the choice architecture, the signal strength was varied between subjects within each treatment. This was done to see if there is any effect of the signal strength. The analysis of the data obtained from the SG experiment show that the subjects in the delight-seeking (disappointment-averse) treatment were significantly less (more) likely to conform to the signal only when the signals were strong. In other words, the experiment data validates the hypotheses of the analytical model in presence of strong signals.

5.1. Contribution of the model

The primary contribution of this paper is the recognition of signal-based decision-making patterns for different personality traits. The generality of the model makes it applicable in a wide variety of real-world problems and can open new avenues for applied research. The most conspicuous area of application of the ideas developed in this paper is consumer behaviour research. Consumers make choice decisions for others when they make purchases for gifting, or for joint consumption, or for consumption by another individual. The literature on consumer behaviour (Lawson, 1997; Ariely, 2000; Choi et al., 2006; Laran, 2010) and particularly that on gift-giving (Belk and Coon, 1993; Belk, 1996; Ward and Broniarczyk, 2011; Steffel and LeBoeuf, 2014; Sarkar and Bose, 2019) recognises the other-pleasing motivation. If applied to the gift-giving context, the central result of this paper implies that gift-givers who seek to surprise the recipient would be less likely to conform to the signals of recipients' beliefs. The role of the recipient's expectation has been addressed in the literature on gift-giving. However, belief signals have not been studied in the context of gift-giving, or in the larger context of choosing for others. Laran (2010) observed that while choosing for others, the DM makes indulgent choices based on her belief about the other's goals. Ruffle (1999) theoretically addresses the role played by the gift-giver's second-order belief. But belief signalling remains an untouched subject in the experimental literature. There is a scope for extending this research to understand belief signalling in an applied context.

The choice model developed here can be extended to develop similar proxy choice models. Proxy DMs often choose medical interventions for incapacitated patients which deviate from the patient's wish (Allen-Burge and Haley, 1997; Allen and Shuster, 2002; Cai et al., 2015; Turnbull et al., 2019). Proxy DMs base their choice on noisy signals about the patient's preferences. For example, familial proxies tend to overestimate the likelihood of the patient's wish to receive treatment (Uhlmann et al., 1988). The proxy choice literature regarding medical intervention focusses on advanced directives of patient's wish and develops models of joint decision-making involving the medical professionals and proxy DMs. The model developed in this paper indicates that the DM's personality trait might interfere in such decision-making process. Hence, applied research in proxy decision-making, for example, in supported decision-making (Kohn et al., 2012; Peterson et al., 2020), may be extended by accounting for personality trait of the familial proxy.

5.2. Limitations and scope of future research

The analytical model developed in this paper assumes that delight or disappointment are triggered by surprise, which is consistent with the extant literature of gift-giving, consumer behaviour and marketing (e.g., Belk, 1996; Ruffle, 1999; Rust and Oliver, 2000; Durgee and Sego, 2001; Vanhamme and De Bont, 2008; Chitturi et al., 2008). The model is useful in studying the choice behaviour when the DM intends to please the other by maximising his psychological utility stemming from surprise. In practice, fulfilment of expectation may also trigger delight. The choice problem gets further complicated if the DM does not know whether meeting the expectation of the other will delight him, or the other gets delighted only when he is pleasantly surprised. Addressing this complexity will enrich the model if the problem remains analytically tractable.

The SG experiment used vignettes to manipulate signals, and behaviour of the subjects has been induced through an incentive mechanism. This laboratory setting is useful in obtaining insights on decision-making under incomplete information about the other's expectation. However, for external validation, and to obtain more insights on the behavioural and psychological aspects of other-pleasing choice, the experiment may be replicated in different socio-cultural and practical contexts. In the real world, people receive signals about others' expectations through interactions, and the signal strength may depend on the closeness or intimacy of the relation between the DM and the other. Future research may be designed to explore how closeness of the relationship impact the formation of second order beliefs, and to examine if the results depend on sociological and cultural factors.

6. Conclusion

The research reported in this paper is conceptual and identifies the effect of signals on the decision-making behaviour of different personality traits, considering that the other-pleasing decision-maker chooses under incomplete information about the other's preferences and expectation. In the analytical model, the decision-maker maximises the psychological utility of the other, based on her second-order belief about what the other expects her to choose. Such second-order belief is formed by signals that she receives. The analytical model led to the paper's hypotheses that, in comparison to a neutral decision-maker, a disappointment-averse decision-maker is more likely and a delight-seeking one is less likely to conform to the signals. A gamified decision-making scenario, simulating the analytical model, was used to test the hypotheses. The experimental results validated the hypotheses, though the results were found to be statistically significant only when strong signals were given to the subjects.

The paper contributes to the choice modelling literature by developing important theoretical insights regarding the role of signals and the decision-maker's personality traits in decision-making for others under incomplete information. Uncertainty about the other's expectation has been hitherto unaddressed in discrete choice models. The insights developed here could be utilised in extending applied and experimental research in several fields, including consumer research, gift-giving, and proxy choice.

Author contributions statement

Conceptualization – Arundhati Sarkar Bose, Sumit Sarkar.
Data curation – Arundhati Sarkar Bose, Sumit Sarkar.
Formal analysis (model) – Sumit Sarkar.
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Investigation – Arundhati Sarkar Bose, Sumit Sarkar.
Methodology – Arundhati Sarkar Bose, Sumit Sarkar.
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