

'I like the way you smile': The reward values of pleasurable smiles

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Introduction

Humans show highly flexible social behaviour. [1]
How do people achieve this? Recent work shows that reinforcement learning may underpin people's ability to adapt to the social environment [2].

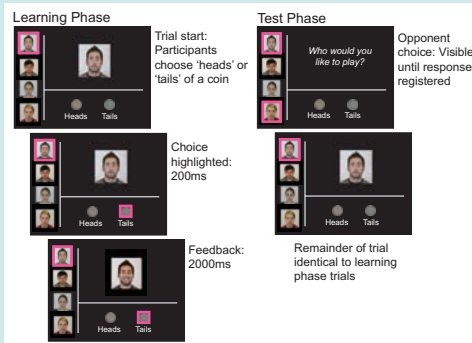
If this is true, then social cues (e.g., facial expressions) should serve as reinforcers.

Facial expressions communicate:

- affect [3]
- intentions [4]
- and other information [5]

These studies test the idea that facial expressions are reinforcing because they have reinforcement value.

Method



Matching Pennies Game:

Participants 'chose the same side of the coin as the opponent.'

- Match Feedback: Smile
- Non-match Feedback: Frown

Smile Feedback: 2 opponents provided genuine smiles and 2 polite smiles

Monetary Reward: All match feedback worth 2 pence (no penalty for incorrect feedback)

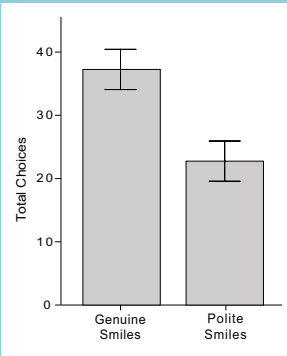
- 80 Learning Trials
- 60 Test Trials (each possible opponent pairing presented 10 times)

Study One

Participants: 36 psychology undergraduates (18M, 18F)
- Mean Age: 19.56 (SD=1.90)

Opponent Reward Probability: 0.7 (all opponents) regardless of whether participants played heads or tails.

Hypothesis: If genuine smiles are more rewarding than polite, participants should choose genuinely smiling opponents more frequently than politely smiling opponents.



Average number of time participants chose opponents that provided either genuine or polite smiles as feedback.

An ANOVA showed participants preferred genuinely smiling opponents, $F(1,35)=21.44, p<0.001$.

Suggests genuine smiles may be inherently more valuable than polite smiles.

Study Two

Participants: 36 psychology undergraduates (14M, 22F)

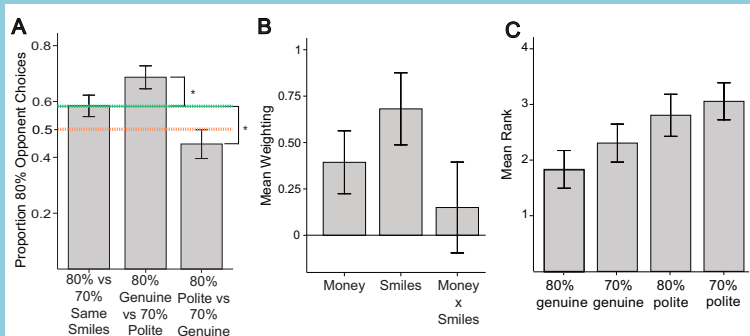
- Mean Age: 20.58 (SD=2.76)

Opponent Reward Probability:

- 0.8 (1 genuinely, 1 politely smiling opponent)
- 0.7 (1 genuinely, 1 politely smiling opponent)
- Participants rewarded regardless of play

Hypothesis: If genuine smiles increase an opponent's utility, genuinely smiling opponents will be more frequently chosen than more objectively valuable politely smiling opponents.

Calculated the proportion of choices of the more valuable (more frequently rewarded) opponent when smile type was constant and subtracted this from the proportion of more valuable opponent choices when smile type differed.



A) Average proportion of choices in which participants selected the higher rewarding 80% stimulus according to the given opponent pairing.

B) Participants subjective weighting of money and smiles estimated from their choice behaviour.

C) Mean explicit ranking of opponent value (1=best, 4=worst).

Genuine smiles from the 80% opponent increased the proportion of 80% opponents chosen, $t(34)=3.59, p=0.001$ (Figure A).

Genuine smiles from the 70% opponent decreased the proportion of 80% opponents chosen, $t(34)=-2.51, p=0.02$ (Figure A).

We used a logistic regression model to estimate the degree to which the value of money and smiles (and the interaction of these factors) contributed to participants' choice behaviour.

Money significantly influenced participants choice behaviour, $t(34)=2.44, p=0.02$ as did smiles, $t(34)=3.72, p=0.001$. The interaction term was not significant, suggesting that the effects of money and smiles were independent, $t(34)=0.61, p=0.55$ (Figure B).

At the end of the task, we asked participants to rank order the opponents in terms of which provided the most rewards. Data showed that genuine smiles inflated estimates of reward value, $F(3,102)=8.24, p<0.001$ (Figure C).

Conclusions

Participants choice behaviour showed they were willing to forego a financial reward in order to receive a social one. This finding was confirmed by our logistic model which showed that both smiles and money significantly contributed to behaviour.

According to participants' reports, genuine smiles altered the utility of social partners, making genuinely smiling partners appear more rewarding.

Suggests social cues carry their own intrinsic reward values and so may function as reinforcers.

As reinforcers social cues could drive the adaptation of behaviour in social interactions.

By showing that cues carry reinforcement value, we provide support for a key assumption of reinforcement learning models of social behaviour - that social cues can serve as reinforcers due to their intrinsic value.

References

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