Exploring the effect of self-concept clarity on social evaluative information processing : A computational modeling approach

Juha Lee, Wooyoung Ahn

Department of Psychology, Seoul National University

INTRODUCTION

- Self-concept clarity (SCC), one of the structural elements of self-representation, is defined as "the extent to which the contents of an individual's self-concept are clearly and confidently defined, internally consistent, and temporally stable" (Campbell et al., 1996).
- Previous studies using self-reported measures have consistently found that high SCC is linked to high levels of social anxiety (SA) symptoms both in clinical and subclinical populations (Stopa et al., 2010), yet little is known about the mechanisms of it.
- Previous studies have proposed that low SCC might associated with vulnerability to external self-referent stimuli and easy to internalize it (Campbell, 1990; Gregory & Peters, 2017).
- Based on the previous studies proposed vulnerability of low SCC individuals, there might be impact of <u>high volatility in belief updating</u> in self-referential social information learning process in low SCC group.

● This high volatility in belief updating might lead to the tendency of easily accepting external social information toward self, which might lead to lack of self positivity bias.

● High volatility in belief updating in social situation where evaluative information are continuously provided, may indicate that the self-concept undergoes high fluctuation constantly which can be aversive and may lead to social situation avoidance.

OBJECTIVES

Research Goal The study aims to elucidate the mechanisms of how SCC links to social anxiety, by exploring the effect of SCC on social evaluative information learning using probabilistic learning task with computational modeling approaches.

Hypothesis

H1 : Low SCC group will show higher accuracy in learning self-referential social evaluative information than high SCC group.

H2 : Low SCC group will show higher ω_2 (belief volatility parameter) than high SCC group.

H3 : High ω_2 will predict high SA symptoms (FNE, SIAS).

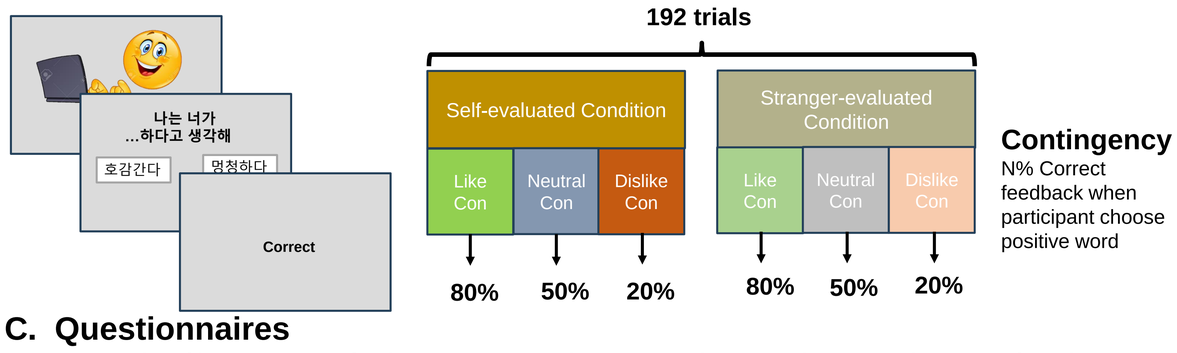
MATERIALS & METHODS

A. Participants

- 38 participants, males (N=12), age of 19-26 (M = 21.84, SD = 1.87)

B. Social Evaluation Task (Button et al., 2015)

- The participants' goal was to predict computer character's opinion toward themselves and stranger, by choosing positive or negative word presented on screen.
- The opinion of the character could change across trials, so participants should have updated belief based on feedback of character given after word selection.



C. Questionnaires

- SCCs (Self-concept clarity measures), BFNE (Fear of Negative Evaluation measures brief version), K-SIAS (Korean Social Interaction Anxiety Scales)

D. Computational model

2-level Hierarchical Gaussian Filter (Mathys, 2014)

- HGF model is a generative Bayesian model capturing the hierarchical internal inference of agent about the state of the world where uncertainty exists.
- The model describes a hierarchy of two hidden states (x_1, x_2) that evolve in time as Gaussian random walks, with the walk's step size are given by individual specific parameter (ω_2).

RESULTS

A. Behavioral Analysis

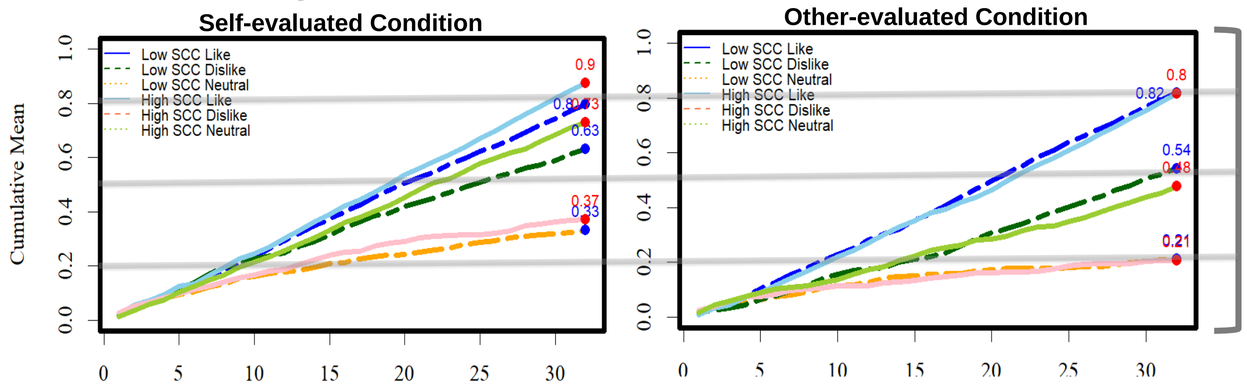
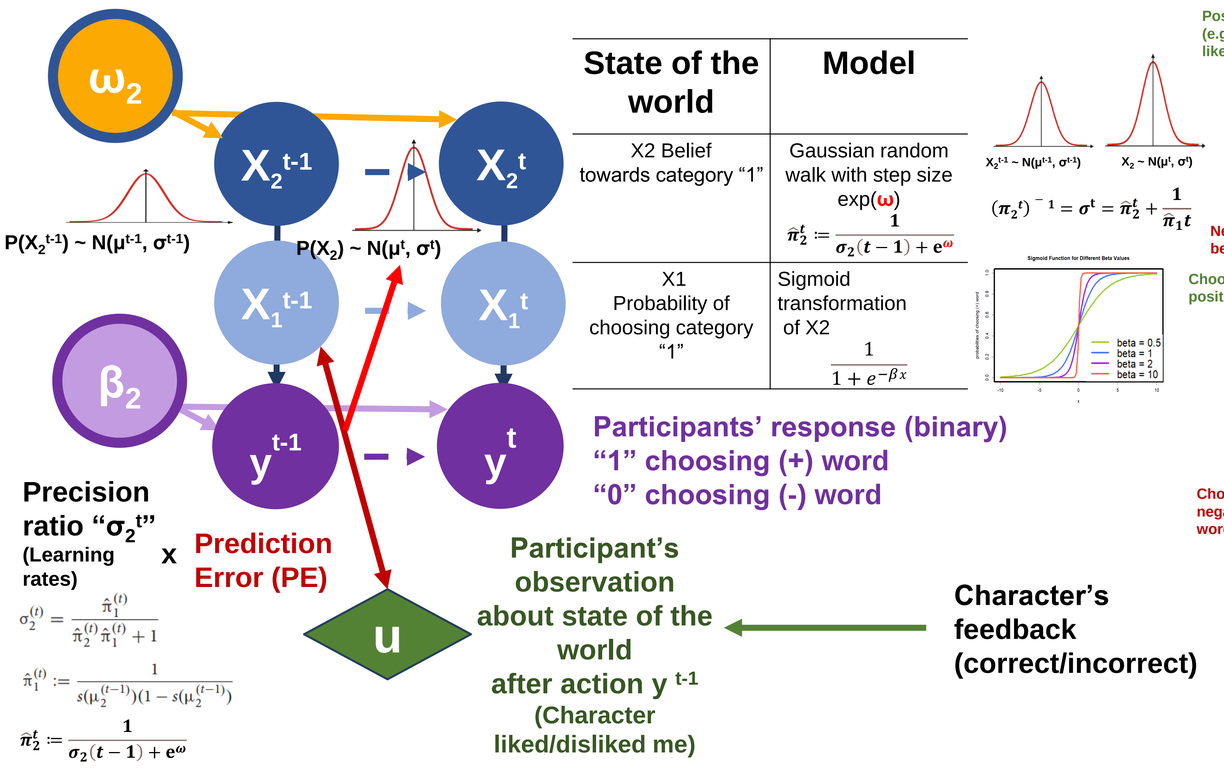


Figure 1. Upper 25% SCC (solid) vs. Lower 25% SCC (dashed), mean accumulative positive response

Result 1 The low SCC group showed a tendency to learn contingency better than the high SCC group only in self-evaluated condition, but the differences were not statistically significant.

B. Computational Model

- 2-level HGF for binary input (Mathys, 2014)



State of the world	Model
X2 Belief towards category "1"	Gaussian random walk with step size exp(ω) $\tilde{\pi}_2^t := \frac{1}{\sigma_2(t-1) + e^{\omega}}$
X1 Probability of choosing category "1"	Sigmoid transformation of X2 $\frac{1}{1+e^{-\beta x}}$

$X_2^{t-1} \sim N(\mu^{t-1}, \sigma^{t-1})$ $X_2 \sim N(\mu^t, \sigma^t)$

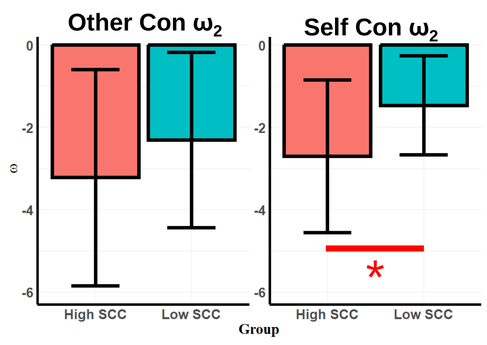
$(\pi_2^t)^{-1} = \sigma^t = \tilde{\pi}_2^t + \frac{1}{\tilde{\pi}_1 t}$

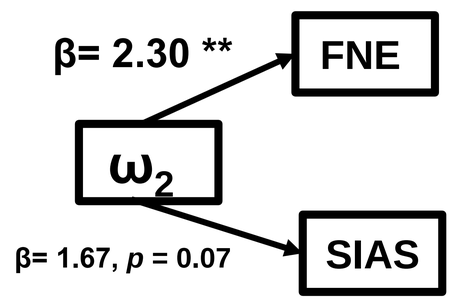
$\sigma_2^{(t)} = \frac{\hat{\pi}_1^{(t)}}{\hat{\pi}_2^{(t)}\hat{\pi}_1^{(t)} + 1}$

$\hat{\pi}_1^{(t)} := \frac{1}{s(\mu_2^{(t-1)})(1 - s(\mu_2^{(t-1)}))}$

$\tilde{\pi}_2^t := \frac{1}{\sigma_2(t-1) + e^{\omega}}$

C. Computational modeling analysis





Result 2 The low SCC group's ω_2 (**-1.47** ±1.20), was significantly higher than high SCC group **(-2.70** ±1.86), indicating that higher volatility in belief (character likes me or dislikes me) updating in low SCC group, only for self-evaluated condition.

Result 3 ω_2 significantly predicted FNE in a positive direction, whereas SIAS did not.

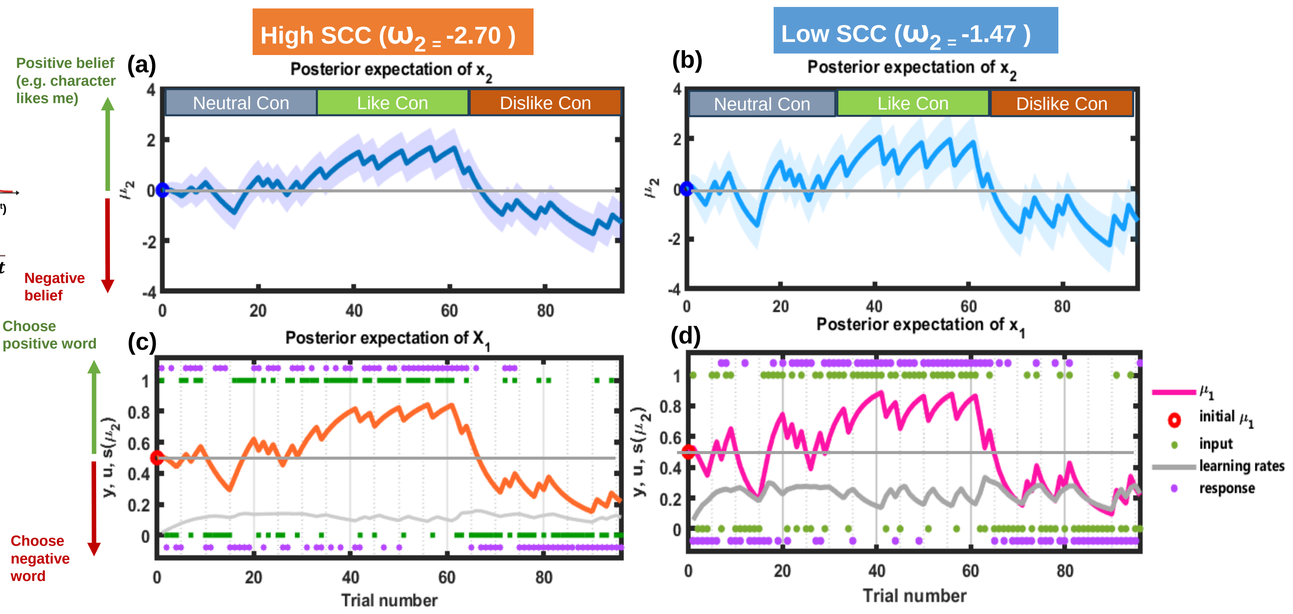


Figure 2. Simulated belief trajectories of high SCC group and low SCC group (a) (c) simulated μ_2 (beliefs about character likes me) and action probabilities $s(\mu_2)$ (choosing positive word) of high SCC group's estimated ω_2 **(-2.70)**, **(b) (d)** for low SCC group (**-1.47**), where we can visually check higher fluctuation in belief and learning rates across all conditions than high SCC group.

CONCLUSIONS

- No significant differences have been observed across low SCC and high SCC group in behavioral data analysis from probabilistic social information learning task.
- However, further computational modeling analysis revealed that low SCC group shows higher volatility parameter at X_2 level (ω_2) than high SCC group, specific to the self-evaluated condition. Furthermore, lower SCC predicted higher levels of FNE symptom significantly. The results indicate that low SCC group has increased tendency to update their belief based on given self-referential evaluative information, and the tendency might be a possible vulnerability to SA symptom.
- The study first empirically demonstrated the possible mechanism of how low SCC links to social anxiety symptoms, supporting the previous explanation that low SCC may represent higher vulnerability to external social stimuli, which may lead to higher anxiety in social situation (Campbell, 1990; Gregory & Peters, 2017).

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