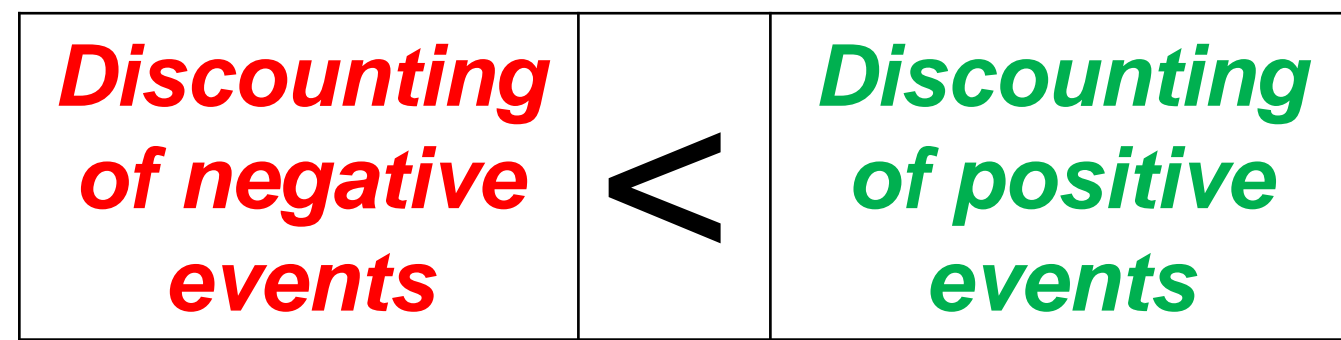# The sign effect in past and future discounting

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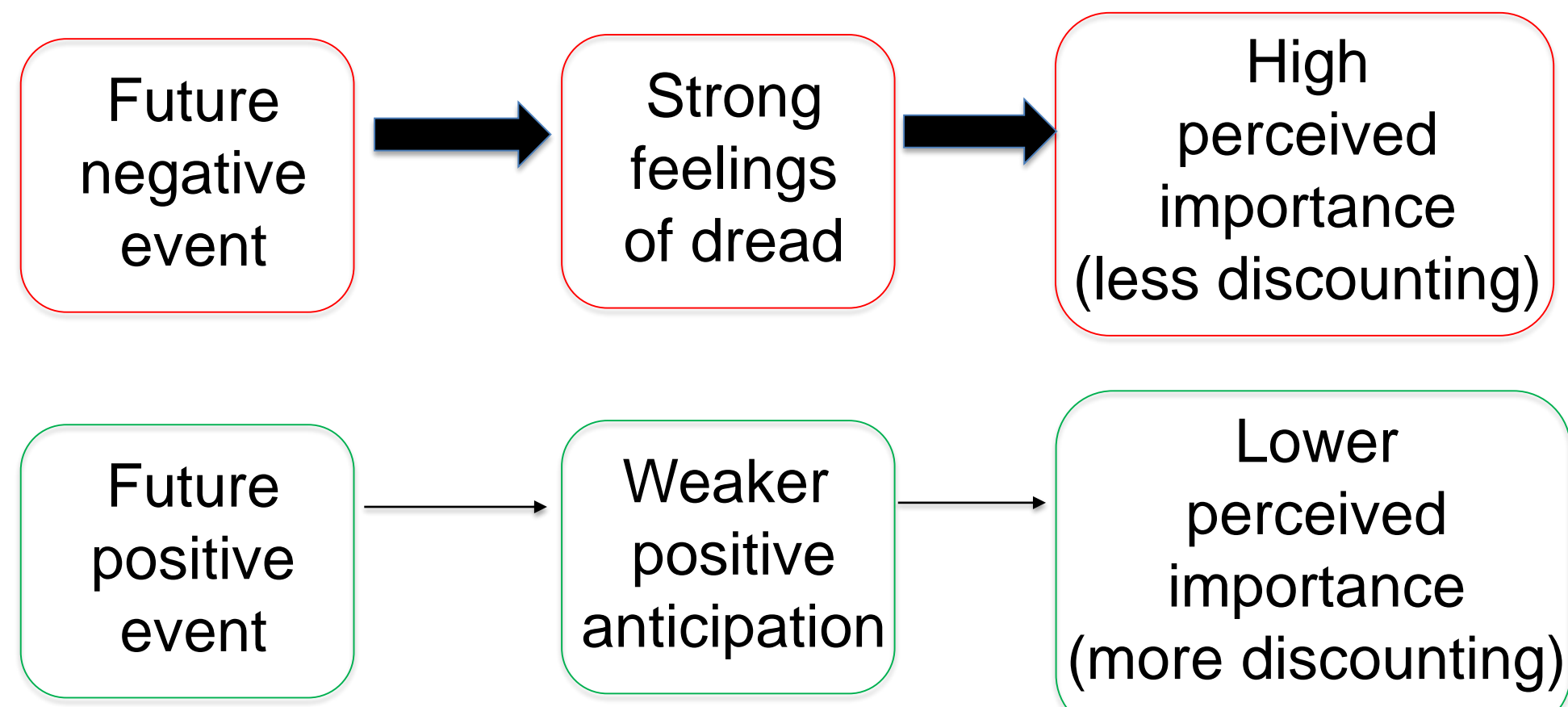
The Sign Effect

- People discount negative future events less than positive future events (Hardisty & Weber, 2009; Thaler, 1981)
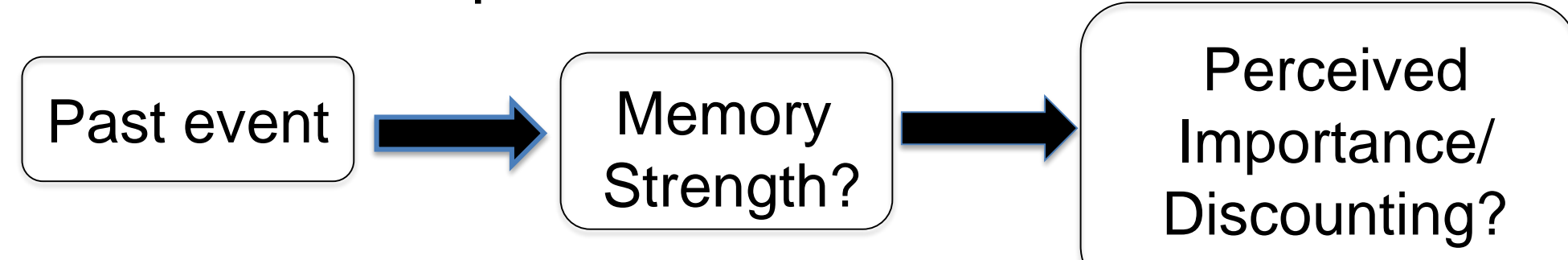
Discounting of negative events	<	*Discounting of positive events*

Possible mechanism:
- Dread stronger than positive anticipation (Hardisty, Frederick, & Weber, 2015)

Future negative event → Strong feelings of dread → High perceived importance (less discounting)

Future positive event → Weaker positive anticipation → Lower perceived importance (more discounting)

The Question

- What about past events?

Past event → Memory Strength? → Perceived Importance/ Discounting?

The hypotheses:

- **Discounting**:
  The sign effect will be attenuated (possibly reversed) for past events (cf. Yi, Gatchalian, & Bickel, 2006)
  ➤ Negative events discounted less than positive events in future, but not in past.

- **Process**:
  ➤ Dread stronger than positive anticipation for future events
  ➤ Memory for past negative events not necessarily stronger than memory for past positive events

The Hypothetical Scenarios (Studies 1a and 1b)

Participants: N = 184 (Study 1a) *N* = 186 (Study 1b); Amazon MTurk

Design and procedure:
- 2 (event valence: positive/negative) X 2 (event timing: past/future) within-subjects titration discounting task
- Positive and negative events equated via pretesting for subjective present value
- For hedonic stimuli, excluded subjects who did not report personal view of event in line with intended valence

Study 1a: monetary stimuli
Positive event: Receive $10
Negative event: Lose $5

Study 1b: hedonic stimuli
Positive event: Receive pleasant 1 hour massage
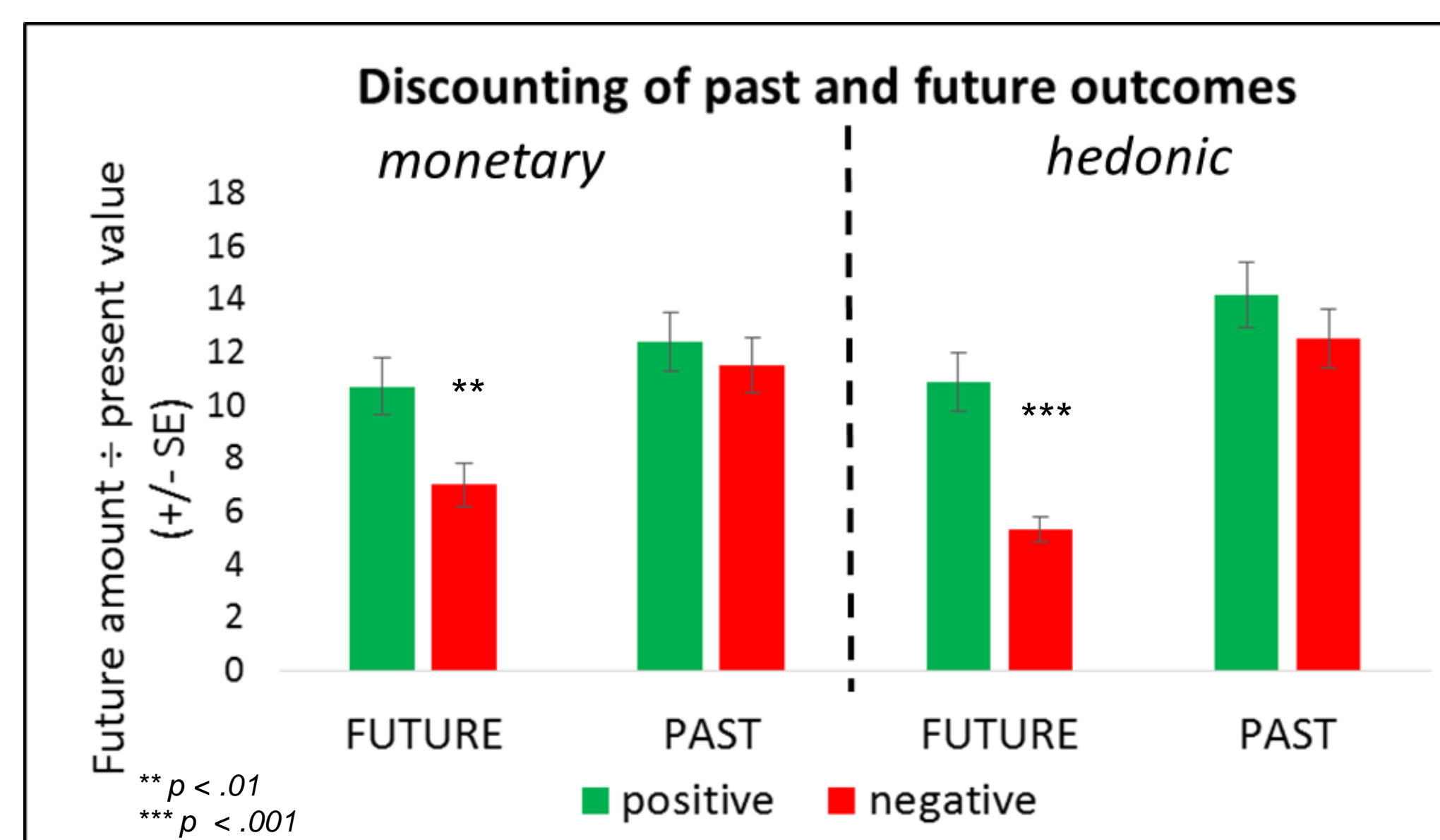Negative event: Receive unpleasant 1 minute electric shock

Time interval:
1 year

Process measure:
- *Anticipation/Memory:*
  "How psychologically pleasurable or displeasurable would the [**anticipation/memory**] [of event] be? In other words, how would you feel while [**waiting for/remembering**] it?"
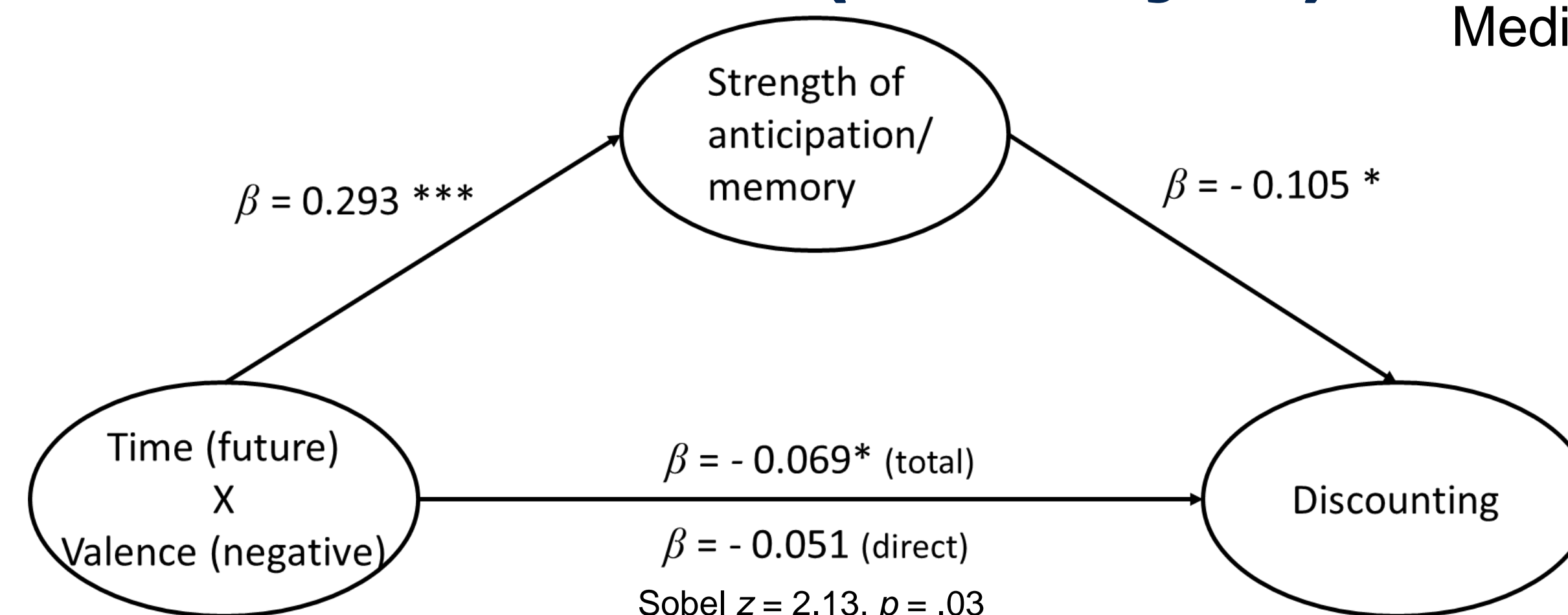

MONETARY: Time x valence $F(1, 183) = 5.54$, $p = .02$, $\eta_p^2 = .03$
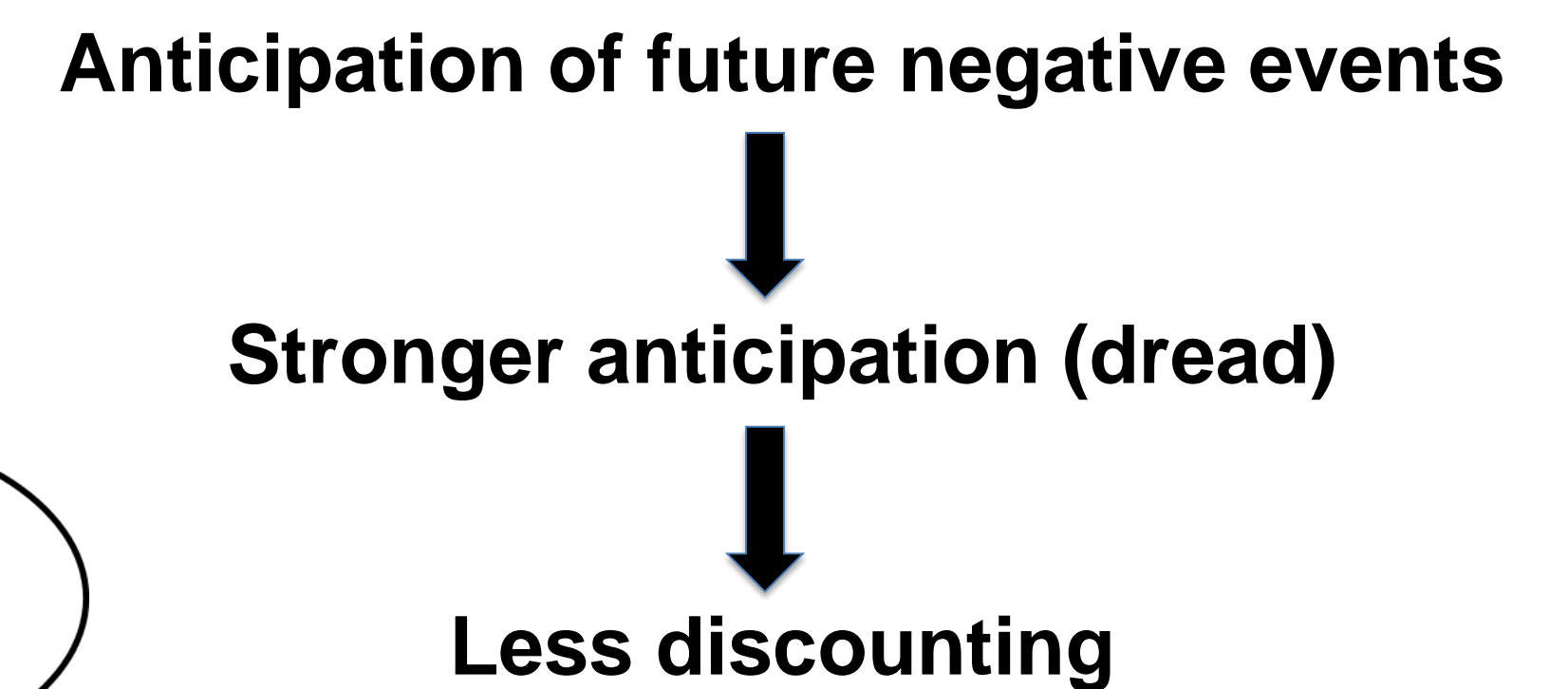HEDONIC: Time x valence $F(1, 176) = 8.13$, $p = .005$, $\eta_p^2 = .04$
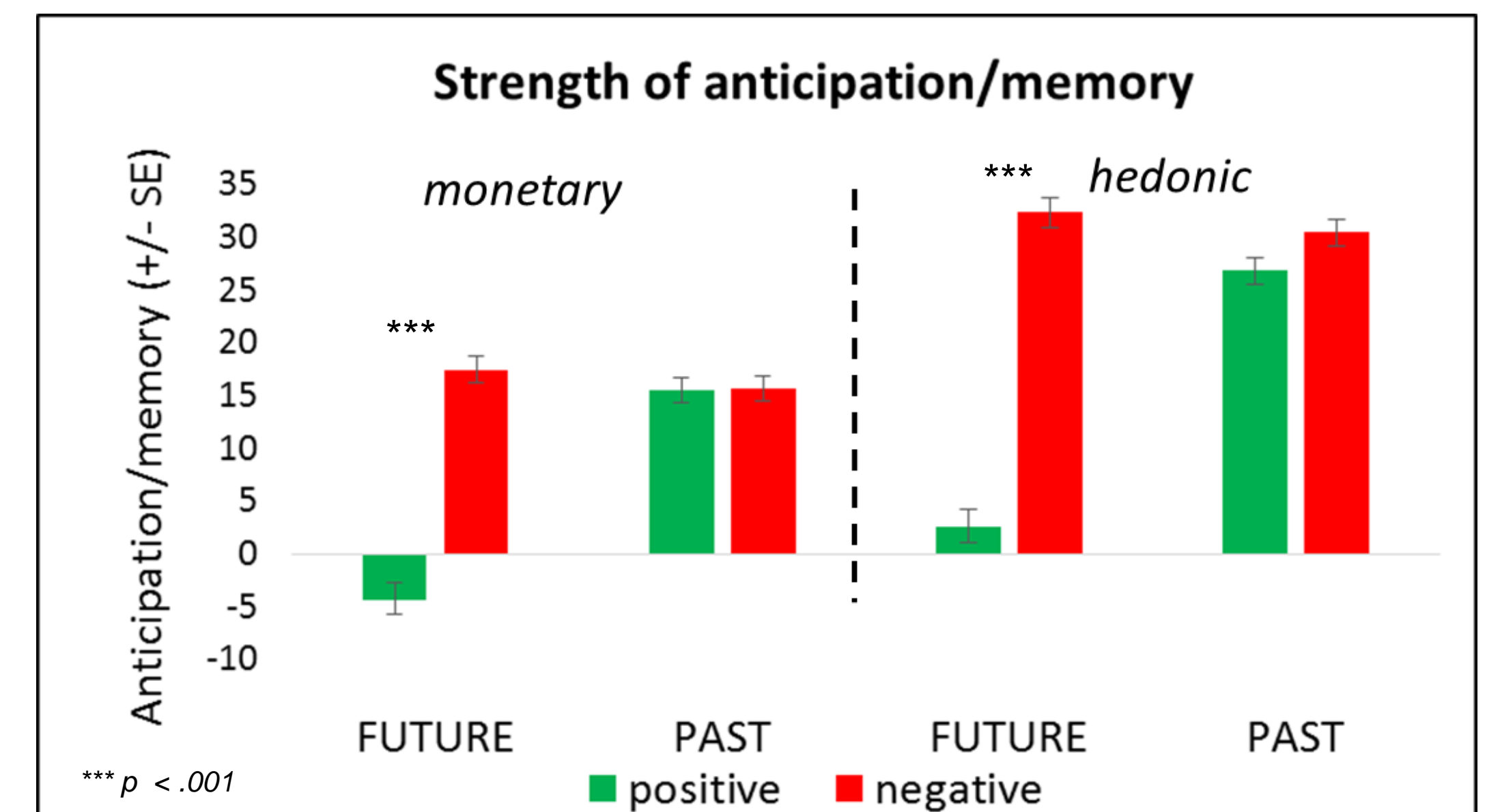
MONETARY: Time x valence $F(1, 183) = 126.21$, $p < .001$, $\eta_p^2 = .41$
HEDONIC: Time x valence $F(1, 176) = 131.84$, $p < .001$, $\eta_p^2 = .43$

The Mediation Model (for Study 1b)

Strength of anticipation/memory

$\beta = 0.293$ *** $\beta = -0.105$ *

Time (future) X Valence (negative)

$\beta = -0.069$* (total)
$\beta = -0.051$ (direct)
Sobel $z = 2.13$, $p = .03$

Discounting

Mediated Moderation (cf. Muller, Judd, & Yzerbyt, 2005)

Anticipation of future negative events
⬇
Stronger anticipation (dread)
⬇
Less discounting

The Beans (Study 2)

- Does the same process occur for actually experienced events?

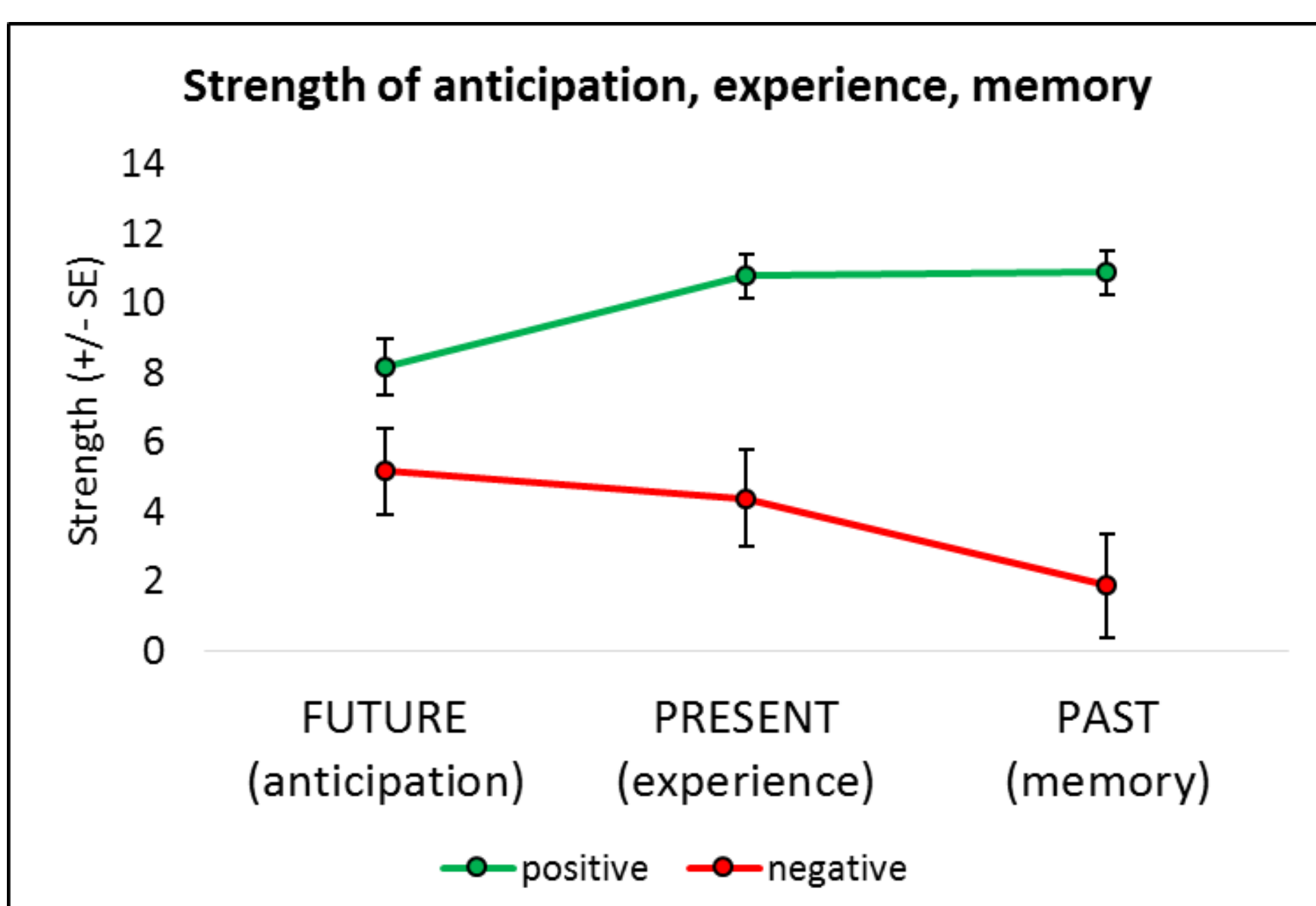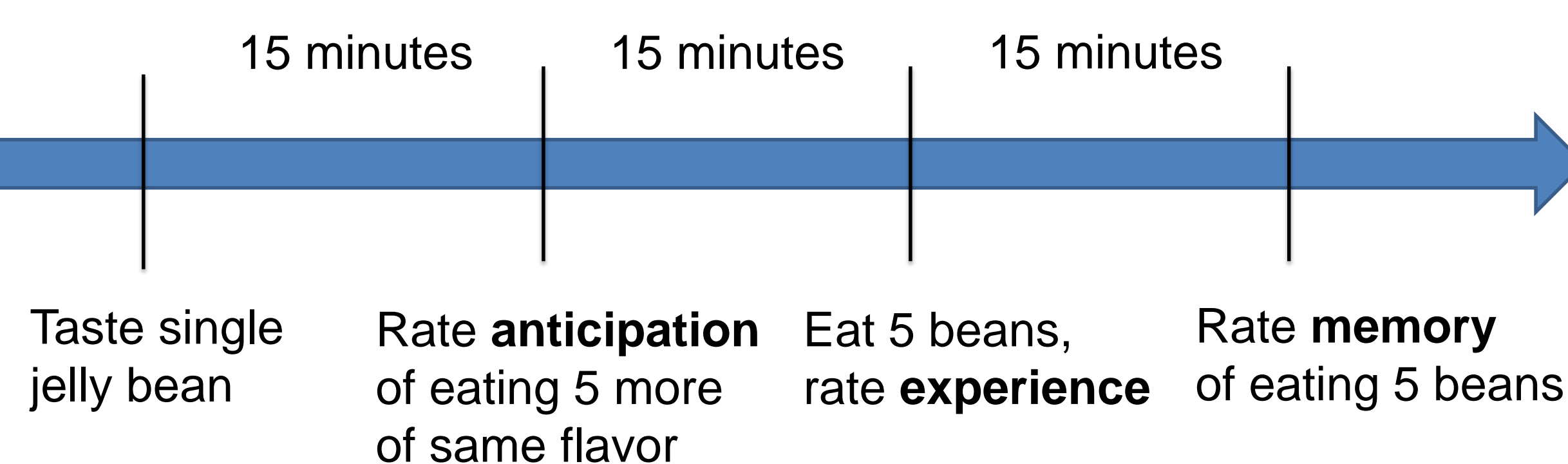*Participants: N* = 104 community members
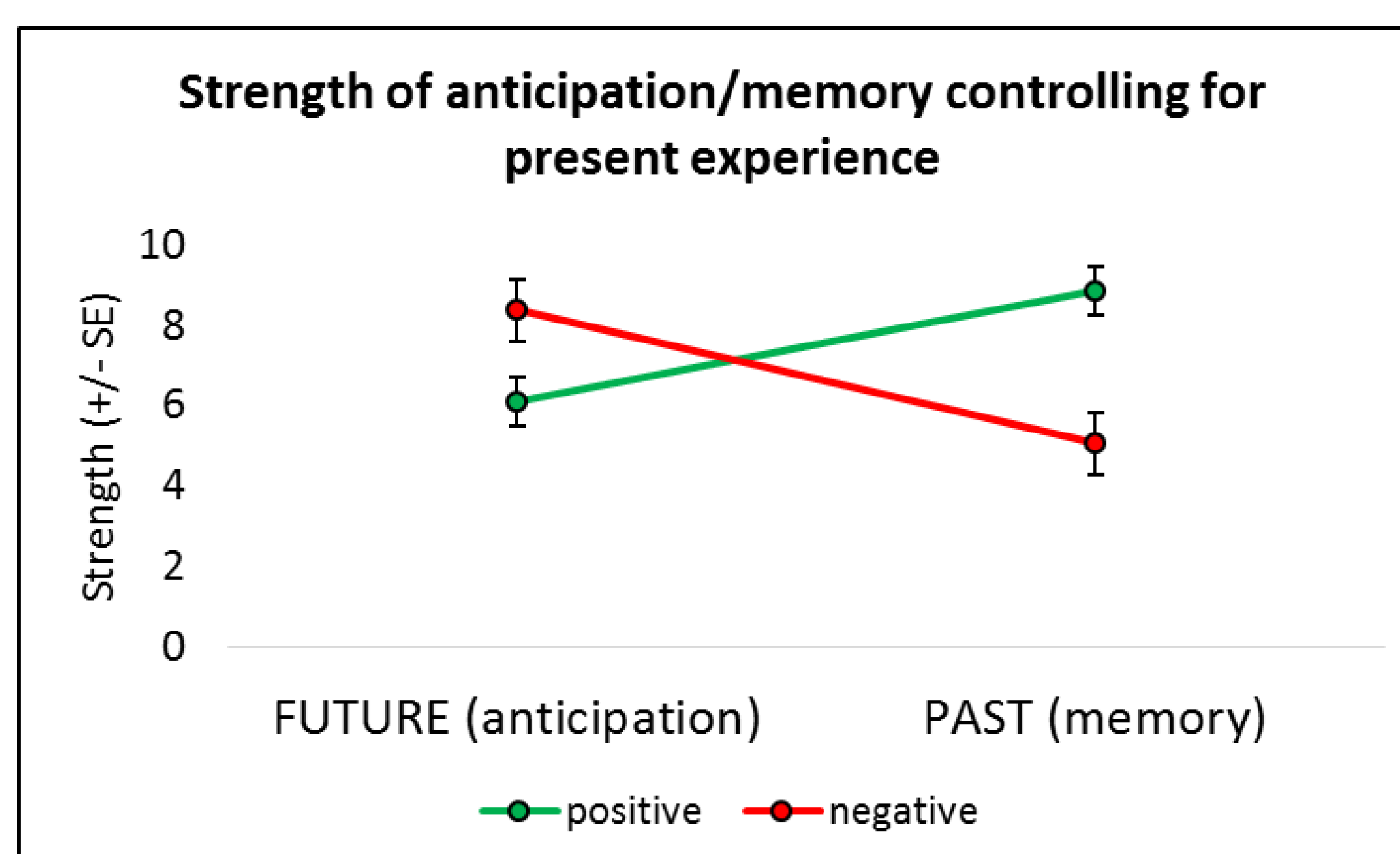2 (positive or negative flavored jelly beans) x 3 (past/present/future rating) mixed design

15 minutes | 15 minutes | 15 minutes

Taste single jelly bean | Rate **anticipation** of eating 5 more of same flavor | Eat 5 beans, rate **experience** | Rate **memory** of eating 5 beans

The flavors:

Positive	Negative
Cotton Candy	Earthworm
Watermelon	Dirt
Orange Sherbert	Booger
	Sausage

Strength of anticipation, experience, memory

Strength of anticipation/memory controlling for present experience

Time x valence $F(2, 204) = 17.22$, $p < .001$

Time x valence $F(1, 102) = 26.20$, $p < .001$

The Conclusions

- Sign effect occurs for future, but not past events

- Because:
  ➤ Dread of future events is stronger than positive anticipation
  ➤ Memory is NOT stronger for negative (vs.positive) past events

Limitations/Future directions:
- Positive jelly beans (study 2) rated higher overall than negative jelly beans.
- Next jelly bean study with better-matched beans and exploring longer time intervals (1 week)

The References

- Frederick, S., Loewenstein, G., & O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of economic literature*, 351-401.
- Hardisty, D. J., Frederick, S., & Weber, E. U. (in revision). The dominance of dread over savoring as an account of the sign effect in discounting.
- Hardisty, D. J. & Weber, E. U. (2009). Discounting future green: Money vs the environment. *Journal of Experimental Psychology: General, 138(3)*, 329-340.
- Thaler, R. (1981). Some empirical evidence on dynamic inconsistency. *Economics Letters*, 8, 201-07.
- Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of personality and social psychology,89*(6), 852.
- Yi, R., Gatchalian, K. M., & Bickel, W. K. (2006). Discounting of past outcomes. *Experimental and clinical psychopharmacology, 14*(3), 311.

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