

# Vision and Flexibility in a Model of Cognitive Dissonance

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- Vision is clearly a valuable asset, in various contexts, especially for leaders: for instance, most business failures are attributed to the lack of vision.
- The first question: Why the conformity bias? Why is it so difficult to exhibit a vision?

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- It is well known that one’s perceptions, preferences and valuations are initially malleable but, once imprinted, become fairly persistent over time (Ariely et al., 2003).
- The second question: Why the anchoring effect and the confirmatory bias? Why is it so difficult to be flexible?

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- Why are they so rare to be found?
- We attempt to answer this question by building on the theory of cognitive dissonance.

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- It suggests that people have uncomfortable feelings when they hold contradictory ideas (attitudes, beliefs, cognitions, facts) simultaneously.
- To reduce dissonance, people change their beliefs and behaviors, often by interpreting events or facts in a self-serving manner.

# Example 1: Sour Grapes

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- The fox manipulates its belief system, to preserve internal consistency.

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- The belief that he is capable and the fact that he failed the test are contradictory.
- The student may conclude that there was a flaw in the text and hence it was meaningless, to preserve his self-esteem concerns.

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- The last premise is particularly important, as it links distorted beliefs with distorted actions.
- People can believe what they want to believe, to some extent, but that is not costless.

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  - Consistent information is exaggerated (obsessive).
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  - Early information is discounted (indecisive).
- The first two results are related to the lack of flexibility while the last is to the lack of vision.

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- For the subjective self, its distribution is  $F$ , with mean  $\mu := \int \eta dF$  and variance  $\sigma^2 := \int \eta^2 dF - \mu^2$ .

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- The first-order condition implies that the optimal action is  $a = \rho$ .

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- The signal is either informative or noisy, and the (objective) probability that it is informative is  $\tilde{\gamma}$ .
- We refer to this probability as the informativeness of the signal.

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- In period 2, things unfold themselves and

$$\text{prob}\{s_2 = \theta \mid \text{the signal is informative}\} = 1.$$

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  - The objective self represents a rational side of DM who is far-sighted and objectively updates the belief.
  - The subjective self represents a primitive and instinctive side who is myopic and cares about her self-images (ego preferences).

# The beliefs

- Let  $g_t$  denote the perceived informativeness of the signal in period  $t$ , where  $g_t = \tilde{\gamma}$  for the objective self and  $g_t = \gamma_t$  for the subjective self.

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- The belief about the current state is defined as

$$\rho_1(s_1; g_1) := \text{prob}\{\theta = 1 \mid s_1, g_1\},$$

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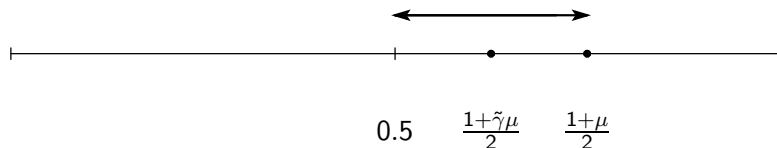
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- The belief about her own ability type is defined as:

$$\mu_1(s_1; g_1) := E[\eta \mid s_1, g_1],$$

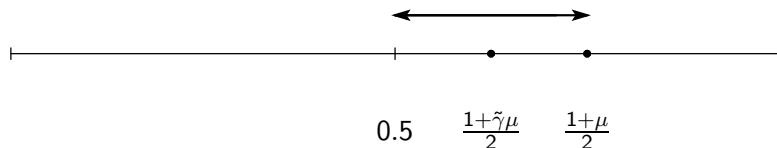
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# The range of the belief about the current state

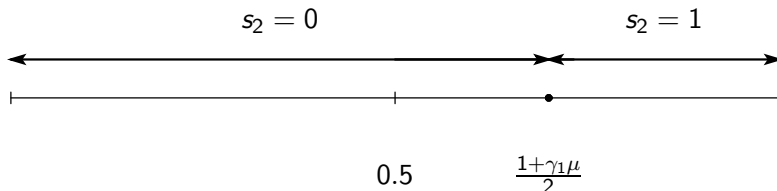


**Figure 1: The manipulable range of the belief when  $s_1 = 1$  ( $\mu = 0.5, \tilde{\gamma} = 0.5$ ).**

# The range of the belief about the current state



**Figure 1: The manipulable range of the belief when  $s_1 = 1$  ( $\mu = 0.5, \tilde{\gamma} = 0.5$ ).**



**Figure 2: The manipulable range of the belief when  $s_1 = 1$  ( $\mu = 0.5, \tilde{\gamma} = 0.5, \gamma_1 = 0.8$ ).**

# The choice of action

- As result of the conflict, DM ends up with some view of the world, which is represented by the information set  $\Omega_t$ :

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- Being the only one to care about the outcome of the project, the objective self chooses the action in each period.
- The optimal action is chosen based on the compromised reality  $\Omega_t$ , so that  $a_t = \text{prob}\{\theta = 1 \mid \Omega_t\}$ , because deviating from this would yield cognitive dissonance.

- The objective self's payoff is the value of the project and given by

$$\pi_1^O(a_1; \gamma_1) = R(a_1, \tilde{\rho}_1) + \Pi_2^O(\gamma_1),$$

$$\pi_2^O(a_1, a_2; \gamma_1, \gamma_2) = R(a_2, \tilde{\rho}_2),$$

where  $\Pi_2^O(\gamma_1)$  is the expected payoff in period 2.

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- The subjective payoff is the current belief about her own ability type and given by

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- The overall payoff is  $\pi_t = \alpha\pi_t^S + (1 - \alpha)\pi_t^O$ , where  $\alpha \in (0, 1)$  is the subjective self's share.

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$$\max_{\gamma_2} \alpha \mu_2(s_1, s_2; \gamma_1, \gamma_2) + (1 - \alpha) R(\rho_2(s_1, s_2; \gamma_1, \gamma_2), \rho_2(s_1, s_2; \tilde{\gamma}, \tilde{\gamma})),$$

taking  $\gamma_1$  as given.

# The second-period problem

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taking  $\gamma_1$  as given.

- If DM can subjectively assign the informativeness of the signal, what should she do?

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- DM tends to underreact to inconsistent information.

## Proposition

Suppose that  $s_1 = 1$ . The optimal bias in period 2 is always positive and given by

$$\rho_2^* - \tilde{\rho}_2 = \frac{\beta\sigma^2\gamma_1}{1 - (\gamma_1\mu)^2}.$$

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The absolute size of the bias is increasing in  $\beta$ ,  $\sigma^2$ ,  $\mu$  and  $\gamma_1$ .

- Here,  $\beta := \alpha/(1 - \alpha)$  is a measure of DM's willpower, where DM lacks willpower to regulate the subjective self when  $\beta$  is small.

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- Let  $b_1^* := \rho_1 - \tilde{\rho}$  denote the optimal bias. The first-order condition is

$$b_1^* = Rb_2^*, \text{ where } R := -\frac{2\beta\sigma^2(1 + (\gamma_1\mu)^2)}{\mu(1 - (\gamma_1\mu)^2)^2}.$$

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- The tradeoff is between the first-period loss and the second-period gain. Vision and flexibility are substitutes.

## Proposition

*Suppose that  $s_1 = 1$ . The optimal bias in period 1 is always negative. The absolute size of the bias is increasing in  $\beta$  and  $\sigma^2$ , whereas it is decreasing in  $\mu$  if*

$$1 - 4(\tilde{\gamma}\mu)^2 - 3(\tilde{\gamma}\mu)^4 > 0.$$

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- DM tends to underreact to early information, giving rise to the emergence of indecisiveness.

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- Rabin and Schrag (1999) and Compte and Postlewaite (2004) explore consequences of confirmatory bias.
- Here, we take a different approach, as we derive confirmatory bias rather than assuming it and exploring its consequences.

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# Discussion on “Vision”

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- A decision maker with low self-confidence is more prone to this problem because the first signal is less reliable and the cost of biasing the interpretation of the first signal is relatively small.
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- It is now well known that time-inconsistent preferences lead to self-control problems, e.g., Carrillo and Mariotti (2000) and Benabou and Tirole (2002).
- Here, the self-control problem arises due to the difference in time horizon between the two selves.

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# Relation to other strands of literature

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- The paper is particularly related to PS where the fear of inconsistent information is the driving force.
- In PS, the agent exaggerates information when young and becomes conservative when old.
- Among several differences, the main difference is that we explicitly consider dynamic incentives.

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# Conclusion

- We construct a model of intrapersonal conflicts between the divided selves to explore how information is processed over time.
- Inflexibility, both ways, arises when the objective self compromises the subjective self in the process of information evaluation. This amounts to confirmatory bias as emphasized in the psychology literature.
- Indecisiveness arises as a consequence of an attempt to regulate the future self. The lack of willpower is the driving force.

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- Indecisiveness arises as a consequence of an attempt to regulate the future self. The lack of willpower is the driving force.
- In general, a decision maker with high confidence exhibits less flexibility but more vision.