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# Dual-process theories and the personal-subpersonal hypothesis

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# Dual-process theory



- System 1

- Non-conscious
- Automatic
- Inflexible
- Fast and effortless
- Associative and/or heuristic
- Parallel
- Nonverbal
- Heavily constrained by biology and not directly responsive to verbal instruction.
- Highly contextualized

- System 2

- Conscious
- Controlled
- Flexible
- Slow and effortful
- Rule-based
- Serial
- Language-involving
- Shaped by culture and directly responsive to verbal instruction.
- Decontextualized

# Introduction



- How are the two systems implemented?
  - Standard view: S1 and S2 are realized in distinct neural subsystems, which operate in parallel (with interaction).
  - Alternative view: the distinction between S1 and S2 is one of levels, corresponding to that between subpersonal processes and personal actions.
- Can this hypothesis accommodate some or all of the relevant data?
  - If so, then some re-interpretation of dual-process theories may be required.
- The origins of the hypothesis: folk psychology's dual-process theory.

# Personal and subpersonal



- Personal states and events are ones that are properly attributed to a human subject.
  - If a personal event is caused in the right way by the subject's beliefs and desires, it counts as an *intentional action*.
  - There are intentional *mental* actions.
- Subpersonal states and events are ones that are properly attributed to some organ or subsystem, rather than to the person as a whole.
  - There are subpersonal mental processes.
- As regards mental events, the personal-subpersonal distinction coincides *roughly* with that between conscious and non-conscious.

# Some notes



- Scientific respectability
  - Personal-level notions may need some precisification, but they offer a rough-and-ready way of marking an important distinction between levels of organization.
- Autonomy
  - We need endorse only a weak autonomy claim, according to which *some* events have distinctively personal-level causal explanations.
- Reductive explanation
  - Personal-level facts will always be reductively explicable in terms of subpersonal ones, though there may not be a clean mapping between personal and subpersonal states.

# Personal and subpersonal reasoning

- Subpersonal reasoning is reasoning that is done by neural subsystems.
- Personal reasoning is reasoning that is done by people.
  - It involves performing intentional actions which implement a procedure for solving the problem and are motivated by the desire to find the solution.
  - Steps in the process typically involve reasoning, either personal or subpersonal.
  - Ultimately, the process breaks down into actions that are the product of subpersonal reasoning.

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# Definitions



- A reasoning process is personal if it constitutively involves a sequence of one or more intentional actions.
- A reasoning process is subpersonal if it does not constitutively involve such a sequence.

# Personal reasoning activities



- Constructing syllogisms or other formal arguments, both deductive and inductive.
- Applying learned heuristics.
- Creating and manipulating diagrams, maps, and pictures.
- Self-interrogation and self-exhortation.
- These activities will need to be supported by various metacognitive skills and habits.



# Comments on personal reasoning



- It need not involve any *overt* activity.
- It need not involve theoretical knowledge of inferential principles.
  - The distinction between personal and subpersonal reasoning does not align with that between explicit and implicit knowledge of inferential principles.
- Many of the activities involved can be learned and refined through formal and informal tuition.
- It need not involve conscious reflection.
- It is likely to show individual and cultural variation.

# The P-SP hypothesis



- **Strong version:** The distinction between S1 and S2 corresponds to that between personal and subpersonal reasoning.
- **Modest version:** The distinction between personal and subpersonal reasoning is the best candidate for a fundamental binary division in human reasoning, along the general lines of the S1/S2 division.

# S1 and subpersonal reasoning



## System 1

- Non-conscious
- Automatic
- Inflexible
- Fast and effortless
- Associative and/or heuristic
- Parallel
- Nonverbal
- Constrained by biology  
and not directly responsive  
to verbal instruction
- Highly contextualized

## Subpersonal reasoning

✓

✓

✓

✓

To some extent

✓

Probably

✓

✓

# S2 and personal reasoning



## System 2

- Conscious
- Controlled
- Flexible
- Slow and effortful
- Rule-based
- Serial
- Language-involving
- Shaped by culture  
and directly responsive  
to verbal instruction
- Decontextualized

## Personal reasoning

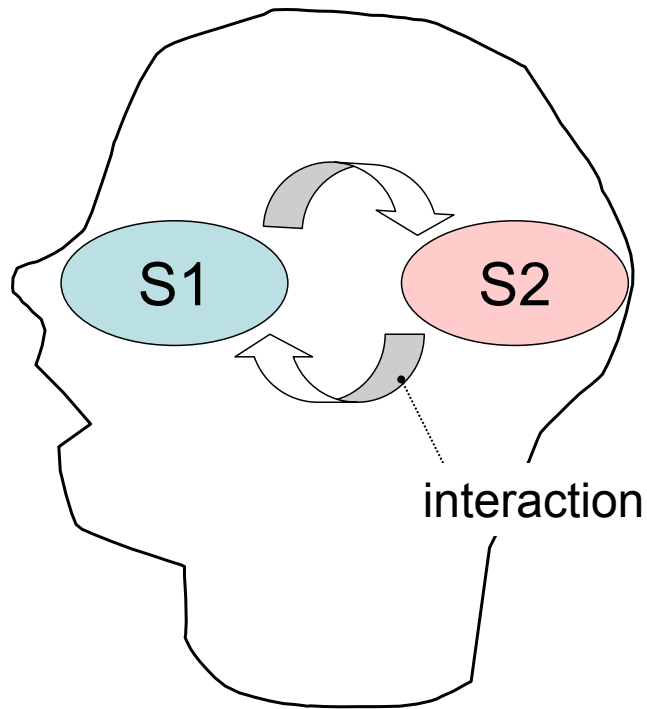
- ✓
- ✓
- ✓
- Often
- Often
- ✓
- Often
- ✓
- ✓

# Consequences



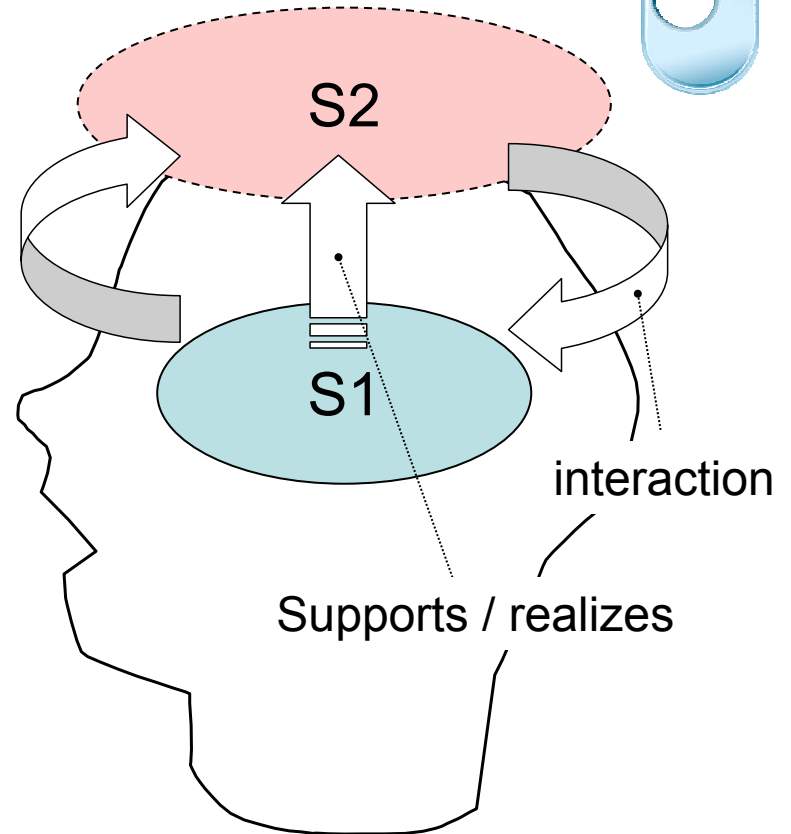
- S2 is not a neural system but a system of behaviours, motivated by personal-level mental states.
- S1 and S2 are organized hierarchically rather than in parallel.
  - The activities that implement S2 reasoning are themselves realized in processes at the S1 level.
  - S2 is not distinct from S1, but emerges from it.
- *Corollary:* there is no need to posit a distinct neural system with S2 properties.

# Parallel vs. hierarchical



**The standard view**

S1 and S2 as parallel systems



**The P-SP view**

S2 is realized in S1

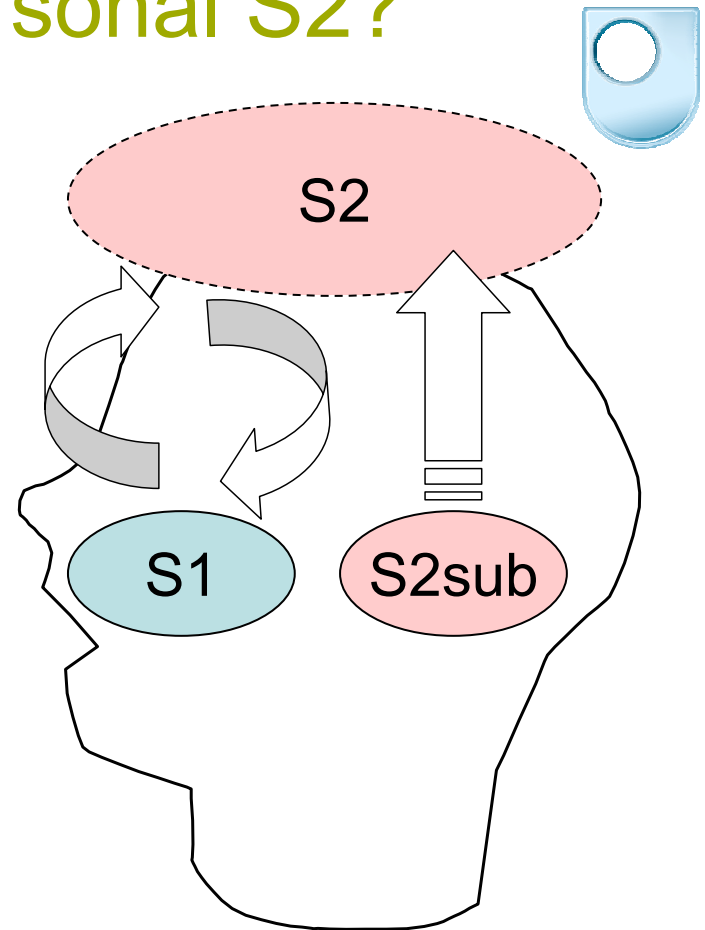
# Objections and replies



- *Objection:* Does it still make sense to think of S1 and S2 as distinct *systems*?
  - *Reply:* Yes. Reasoning at the two levels has different characteristics and is devoted to different tasks. The fact that one type of reasoning is realized in the other is irrelevant.
- *Objection:* But can there be *interaction* between the two systems?
  - *Reply:* Yes. Subpersonal reasoning may supply premises for personal reasoning. And the outcomes of personal reasoning may affect subpersonal processing, albeit indirectly.

# The return of a subpersonal S2?

- *Objection:* Personal reasoning will have its own distinctive set of subpersonal processing resources. So there will still be a distinct subpersonal system involved in S2 reasoning.
  - *Reply 1:* Executive control may not be subpersonally unified.
  - *Reply 2:* Personal reasoning does not always require executive control.
  - *Reply 3:* Other resources will be involved in supporting personal reasoning, in addition to those involved in executive control.



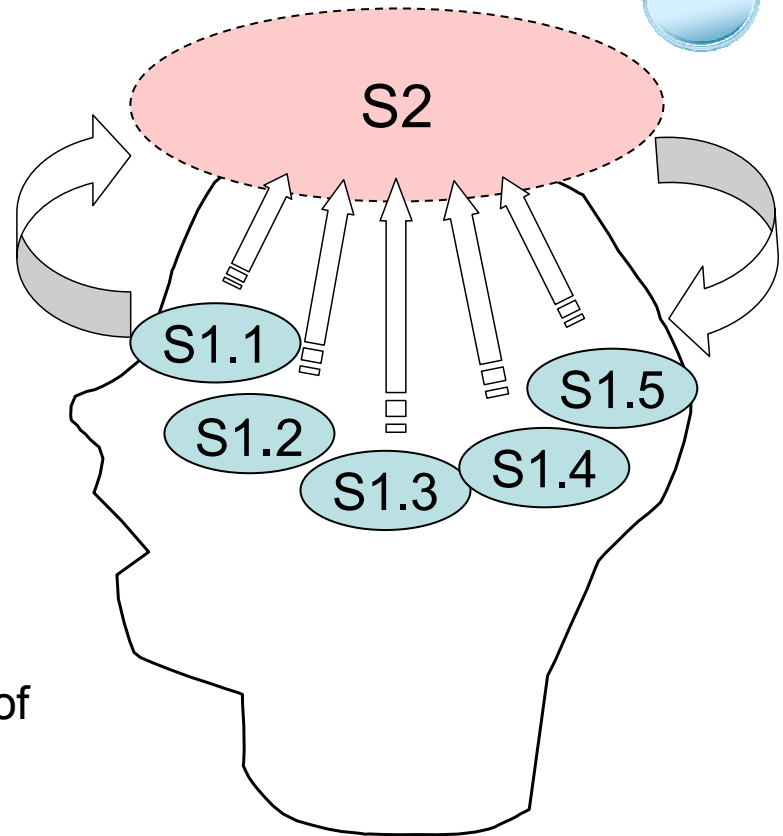
Personal-level S2 generated by a distinct subpersonal system



# Personal unity, subpersonal division



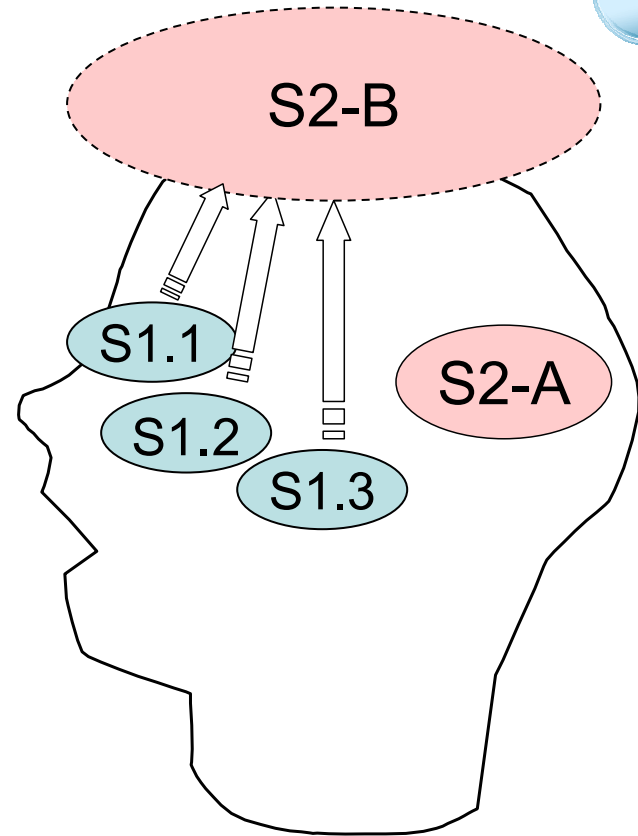
- Subpersonal resources involved in supporting personal reasoning:
  - The various components of executive control.
  - The language system.
  - Sensory imagination and motor rehearsal.
  - The resources supporting meta-representational thought.
  - The resources supporting learned skills in argument construction, etc.
  - The systems encoding knowledge of inferential rules, logical concepts, etc.
- The unity of the system appears only when we adopt the personal-level perspective.



Personal-level S2 supported by many subpersonal systems

# Two System 2s?

- *Objection:* Not all of the phenomena ascribed to S2 are personal-level ones, so we still need to posit a subpersonal S2-type system.
  - *Reply:* Some revision of dual-process theories would then be required. S2 would bifurcate into personal and subpersonal components.

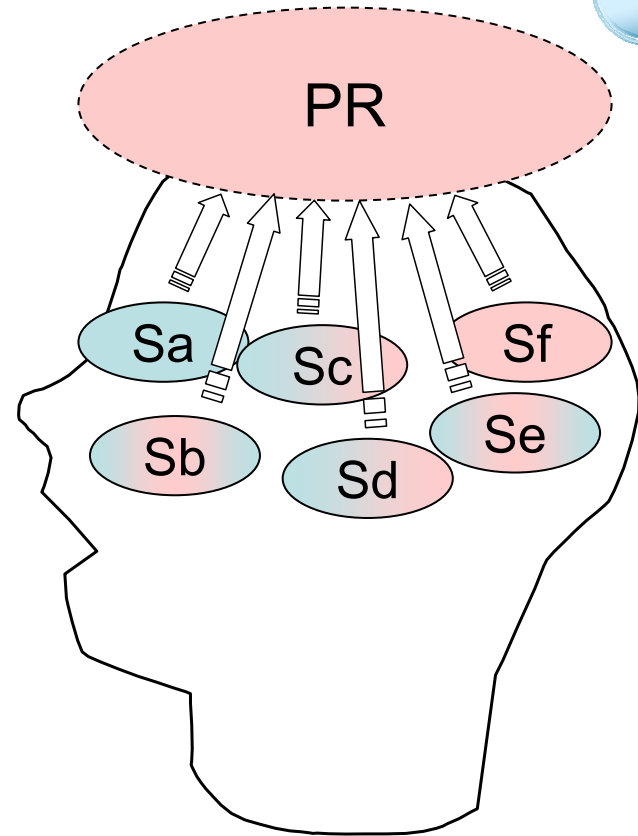


Two distinct S2-type systems

# The challenge from modularity



- *Challenge*: If S1 and S2 are composed of suites of sub-systems, perhaps there are also hybrid subsystems with some S1-type properties and some S2-type properties.
- *P-SP response*: If S2 is a personal-level system, then we can hold on to the idea that there is a unitary System 2.
  - The P-SP hypothesis may offer the best way of vindicating the intuition that there is a fundamental duality in human reasoning



A rainbow coalition of subpersonal sub-systems

# The challenge from evolution



- *Challenge*: How did S2 evolve?
  - Would there have been enough time for the emergence of specialized neural adaptations for S2 thinking?
- *P-SP response*: We do not have to posit such adaptations.
  - S2 owes its origins to culture as much as biology.
  - S2 may be a *kluge* – a jury-rigged system assembled from pre-existing components originally designed for other purposes.

# The challenge from agency



- *Challenge*: If S1 and S2 serve different purposes, have different goals, and are associated with different forms of rationality, how do they combine to constitute a single agent?
- *P-SP response*: The actions involved in S2 reasoning and decision-making serve the goals of the S1 system.
  - It will be evolutionarily rational to be normatively rational, and it will be possible to account for all our actions within a single normative framework.

# Modest conclusions

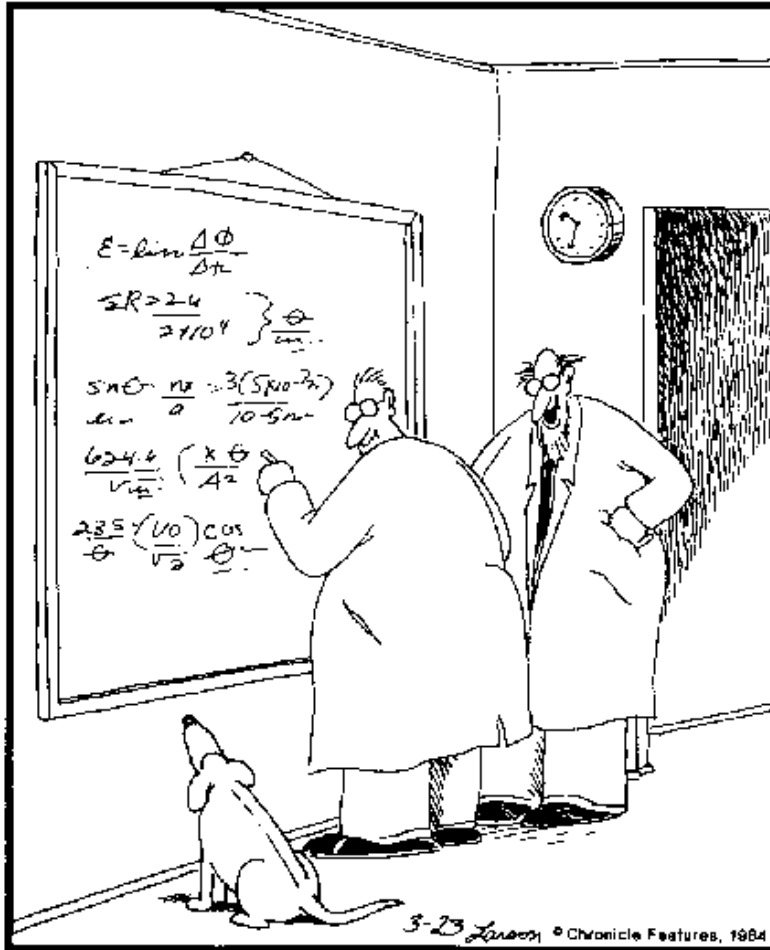


- There is an important distinction to be drawn between personal and subpersonal reasoning
- If the P-SP hypothesis is correct, then some reinterpretation of dual-process theory is required.
- The P-SP hypothesis has some theoretical attractions.

## Concluding question

- Is the P-SP hypothesis correct? How much of the evidence for a S1/S2 distinction can be accounted for by the existence of the distinction between personal and subpersonal reasoning?

# The Larson cartoon



“Ohhhhhhhh ... Look at that, Shuster ... Dogs are so cute when they try to comprehend quantum —mechanics.”

*do personal S2-type reasoning*