The Role of Causal Explanation in Decision Making

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Abstract

Plausibly in decision making one uses causal information if doing so is useful. In clinical decision making knowing about causes sometimes but not always has utility for treatment decisions. Current empirical evidence is sparse and mixed. We set up an experiment in which we asked participants to learn about artificial disorders before deciding on patients' treatments. For some but not all cases the consideration of causes was helpful for treatment decisions. We found that participants search for causal information when deciding on a treatment only if knowing about the causes would entail a specific intervention. We conclude that causal explanations are used adaptively in choice.

Introduction

Knowing causes is relevant when such knowledge makes a difference for subsequent decisions. In clinical situations this is the case when causal knowledge has a positive treatment utility (Haynes et al., 2012). Causes are less relevant when they are unrelated to choice. In mental health this may be the case when there are evidence-based treatments that address symptoms regardless of their causes (Herbert, 2003). Empirical findings about clinicians' behaviour are inconclusive. Some findings indicate that clinicians search for and consider causes when choosing interventions, others that they do not care about causal explanations (Groenier et al., 2008).

Main Hypothesis

People only take causal explanations into account when it allows them to improve their decisions.

Methods

Participants were asked to learn three fictitious mental disorders, each with a different underlying causal structure (see Figure 1) and their treatments, which targeted symptoms or causes (see Figures 2a/b). This was followed by a test phase in which a symptom was presented and participants chose an intervention either directly or after asking for more symptoms or causes (see test cases, Figures 3-5).

Learning Phase (48 trials with corrective feedback)
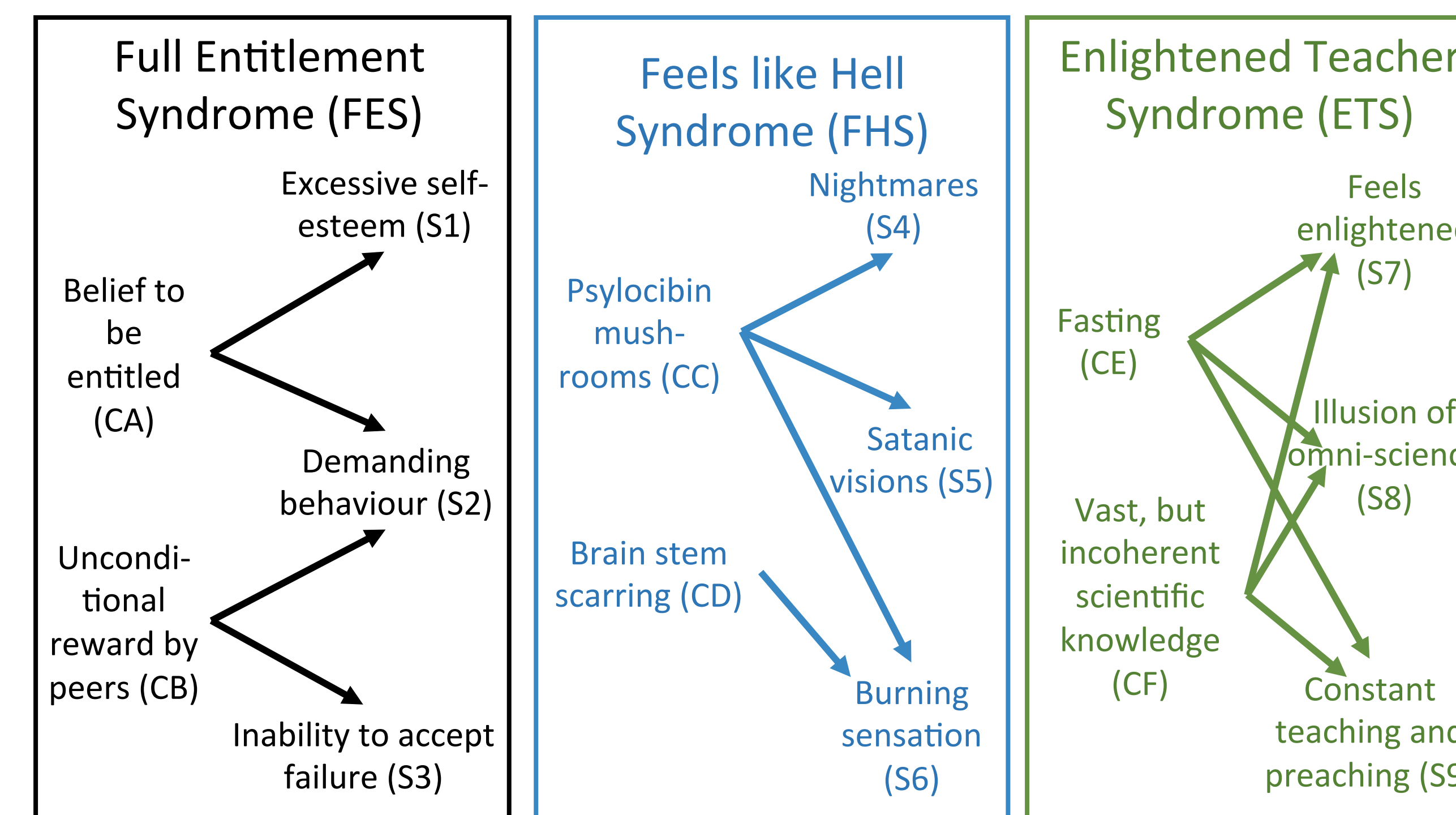
Figure 1: The three fictitious disorders

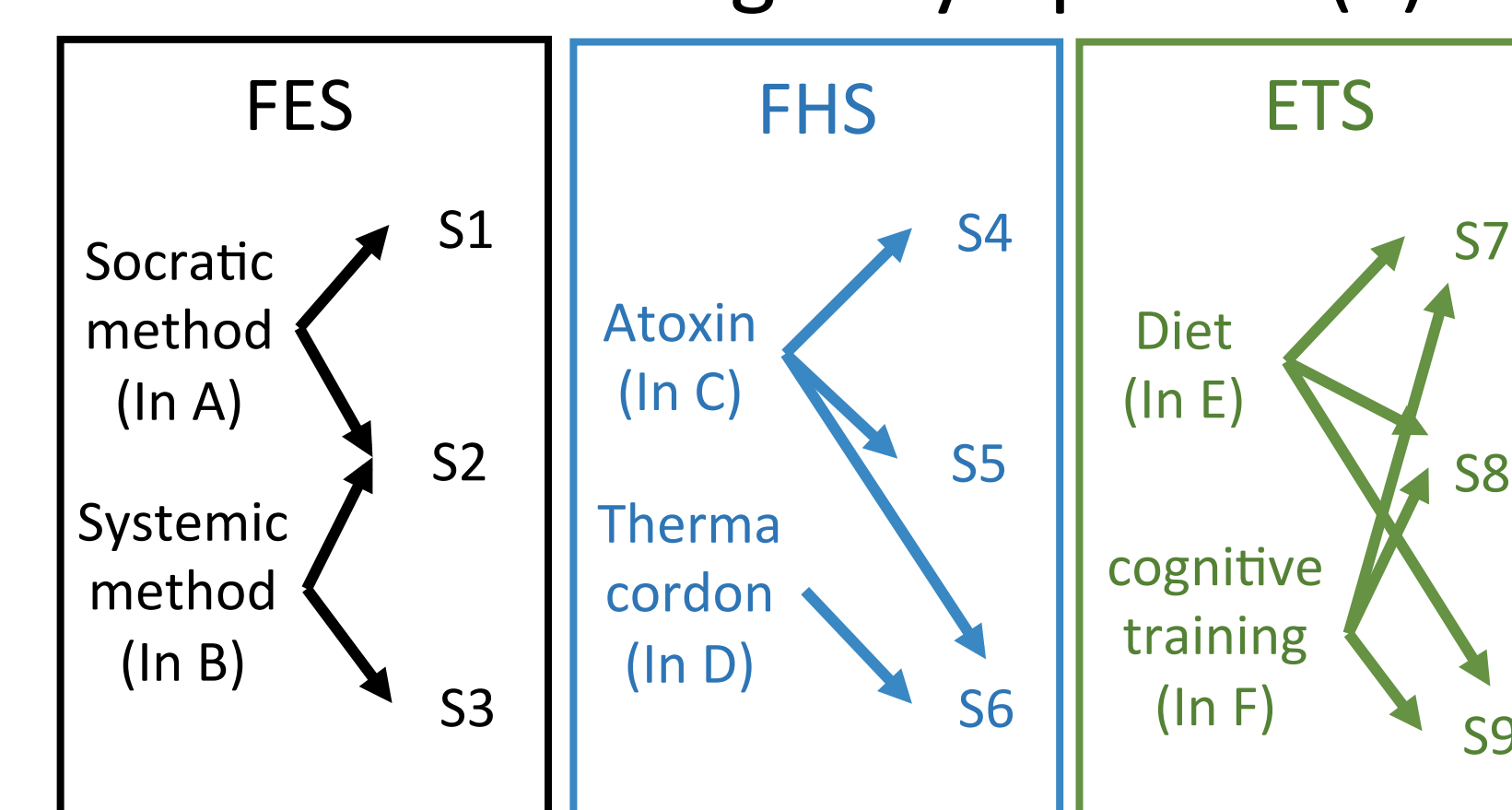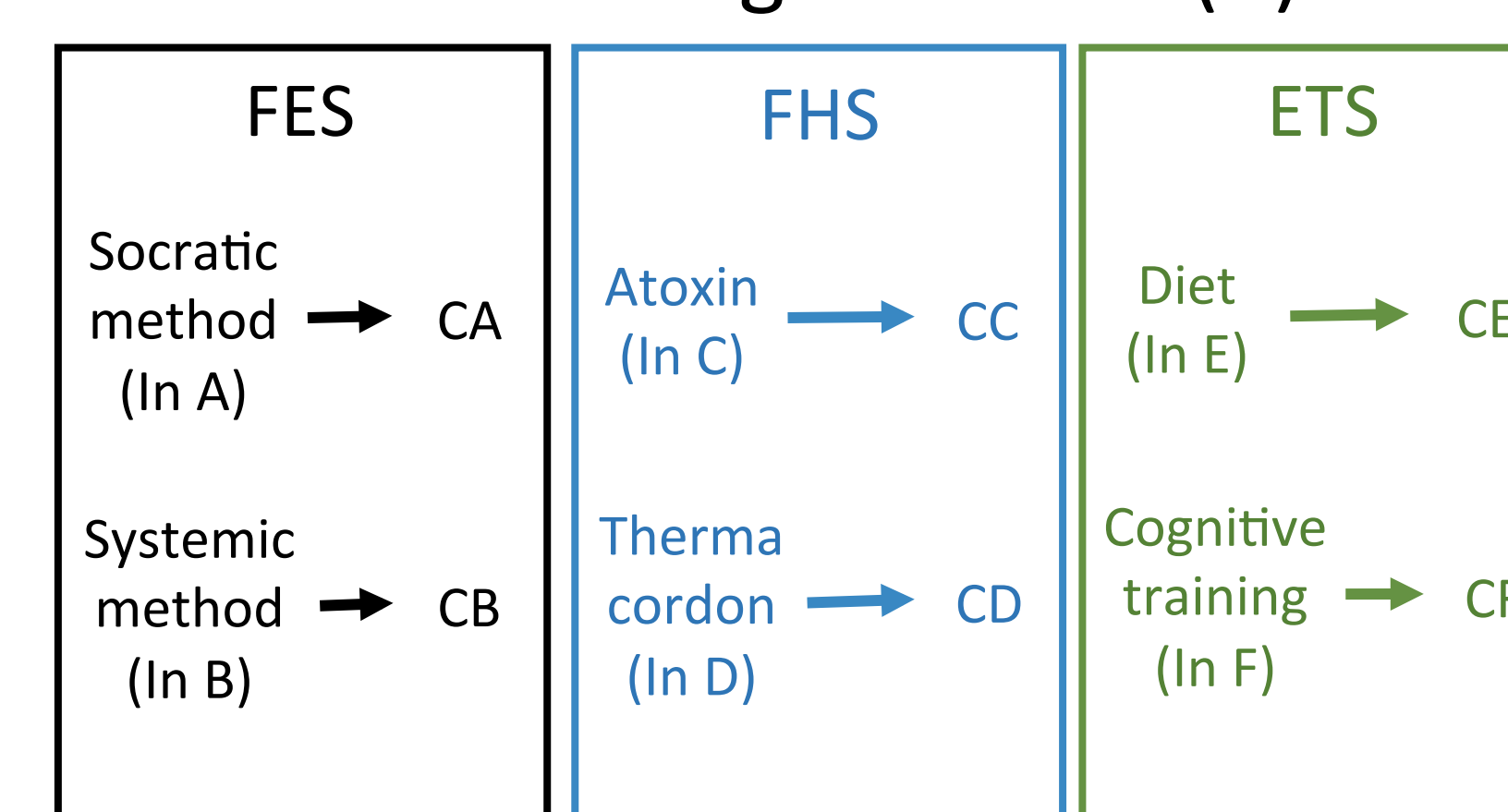Figure 2a: Condition 1
Interventions target Symptoms (S)

Figure 2b: Condition 2
Interventions target Causes (C)

Test phase (4 trials of each type of test case)

Test Case 1: First symptom (highlighted) is sufficient to choose best intervention
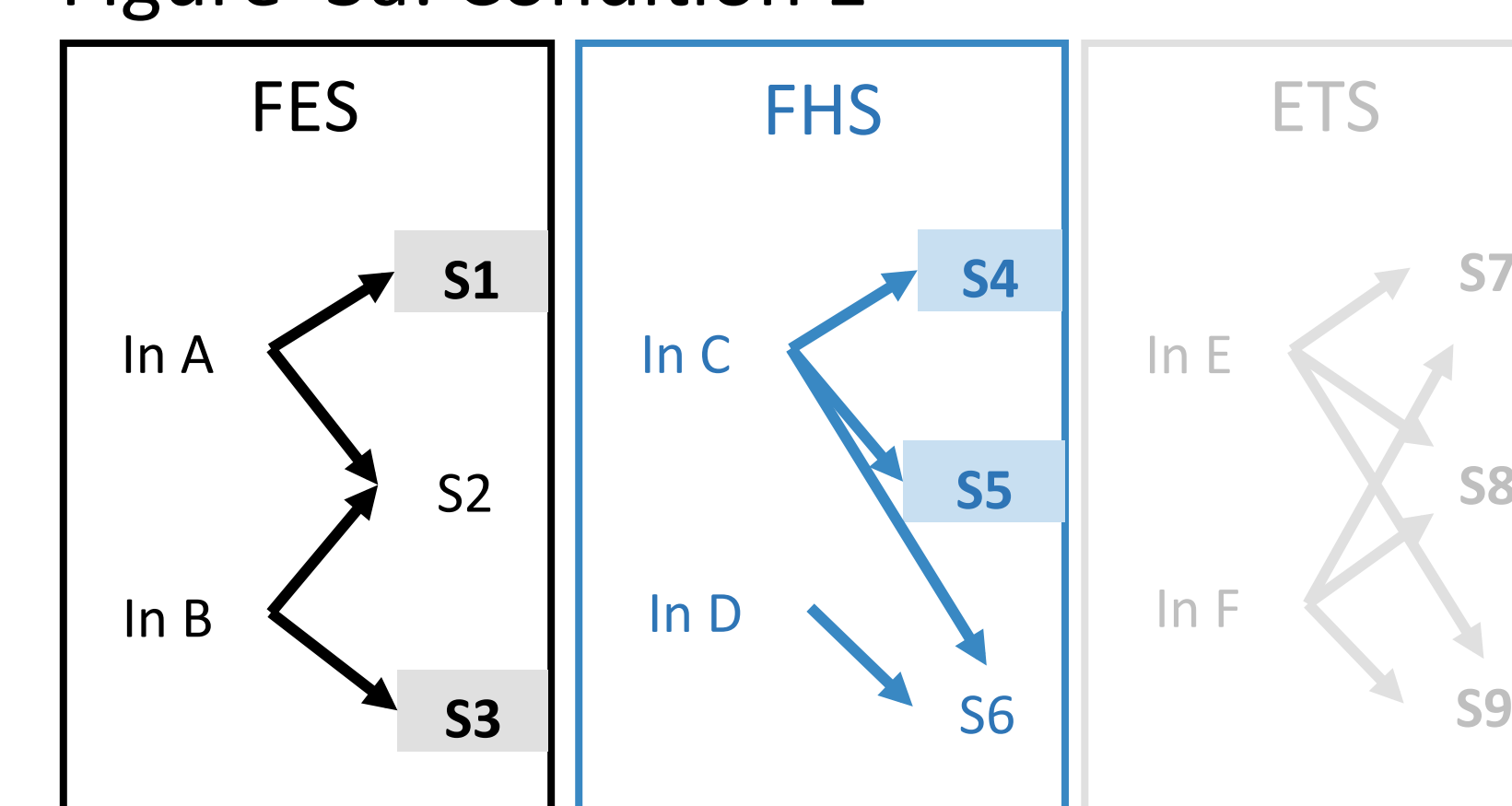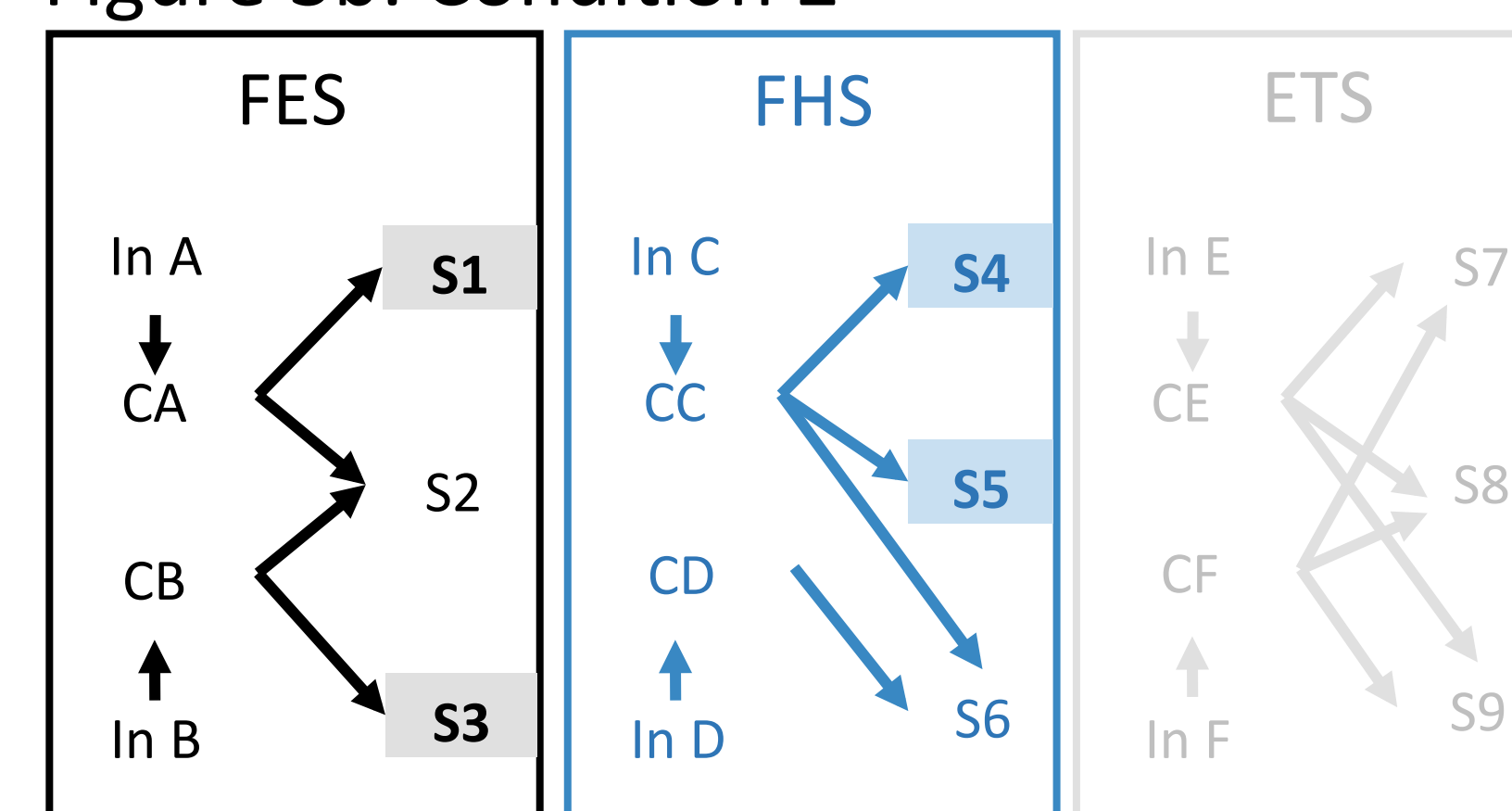
Figure 3a: Condition 1   Figure 3b: Condition 2

Test Case 2: Search for one additional symptom (condition 1) or one additional symptom or cause (condition 2) is sufficient
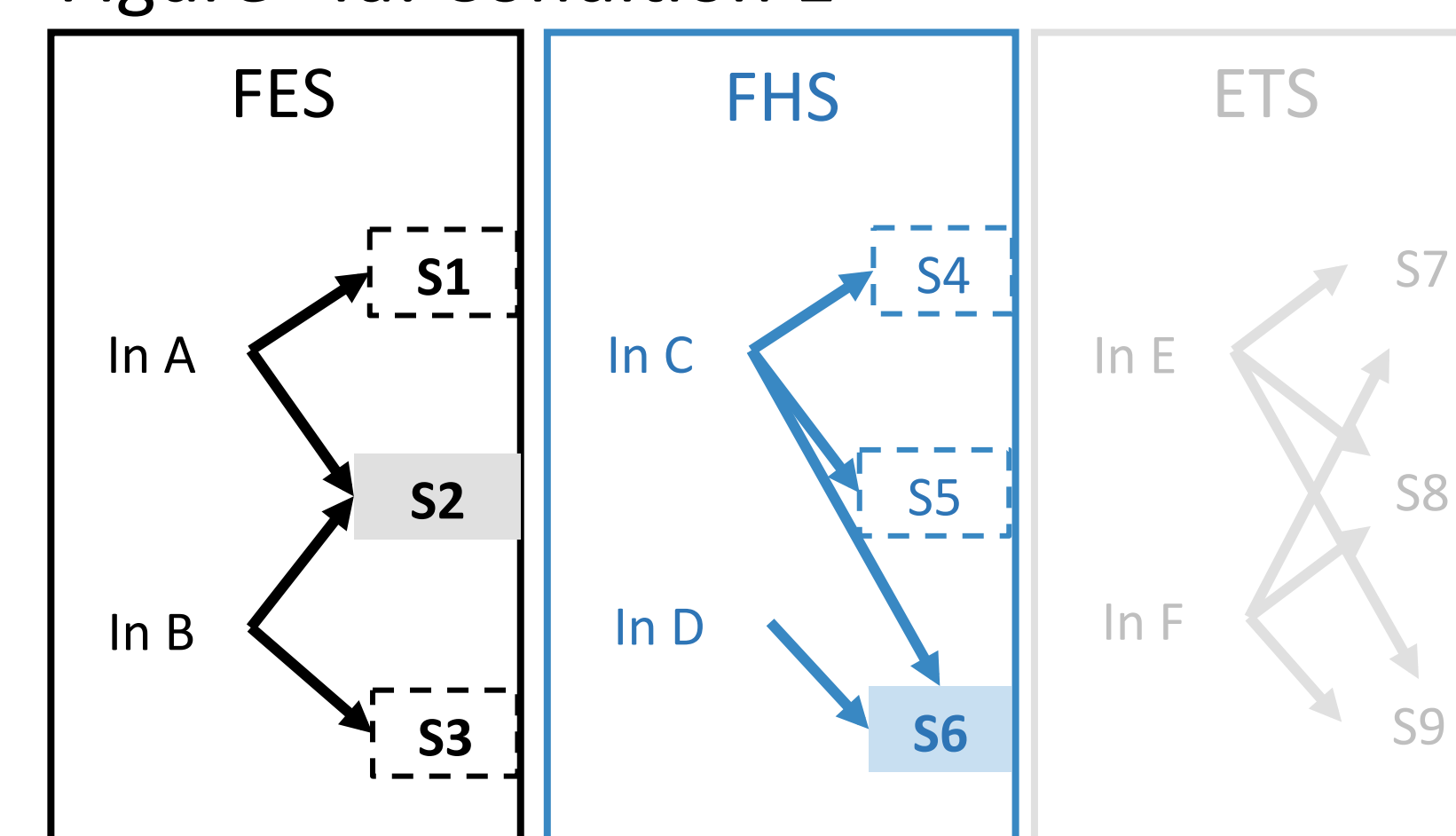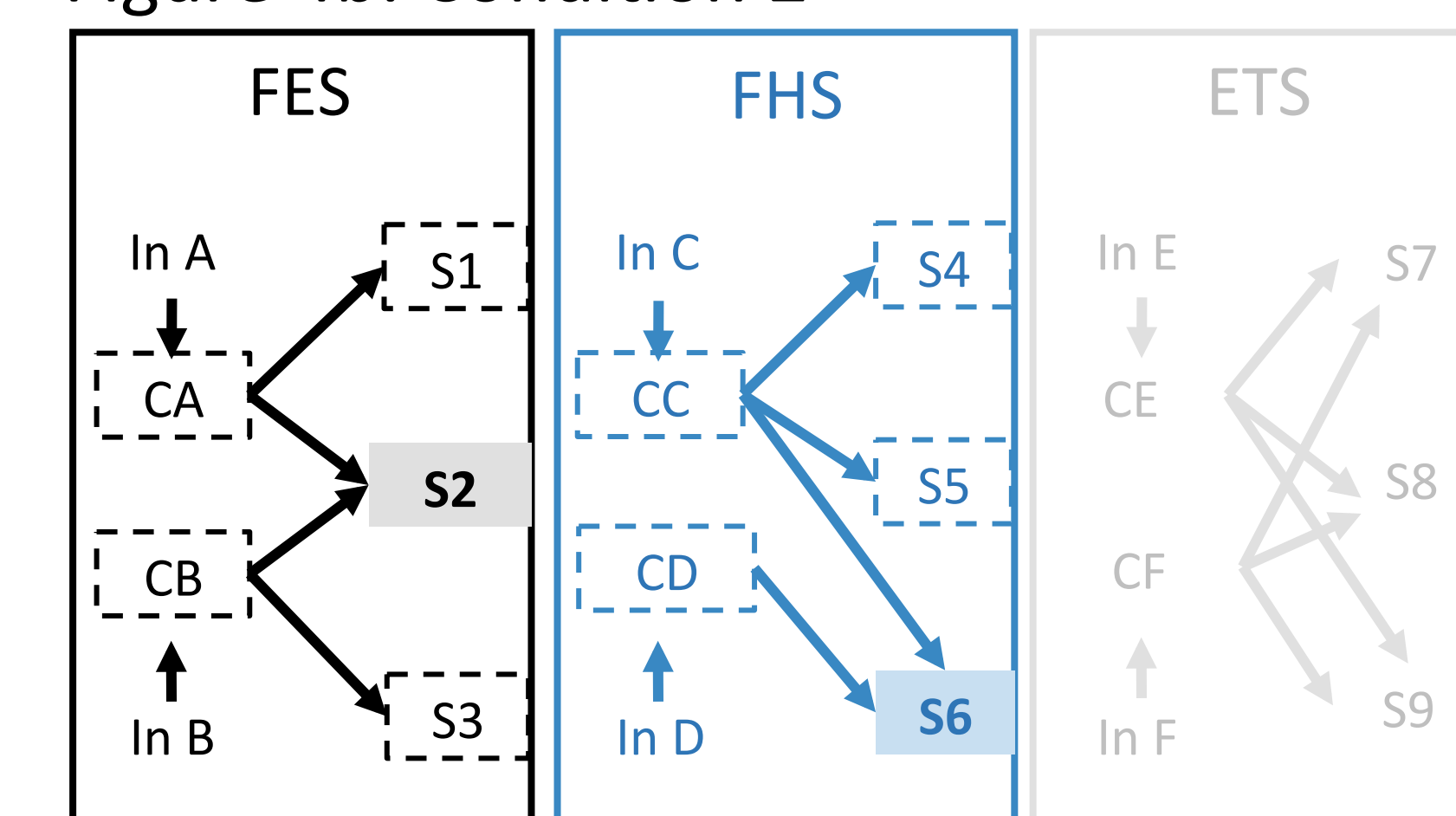
Figure 4a: Condition 1   Figure 4b: Condition 2

Test Case 3: First symptom is sufficient (condition 1) or search for cause is necessary (condition 2)
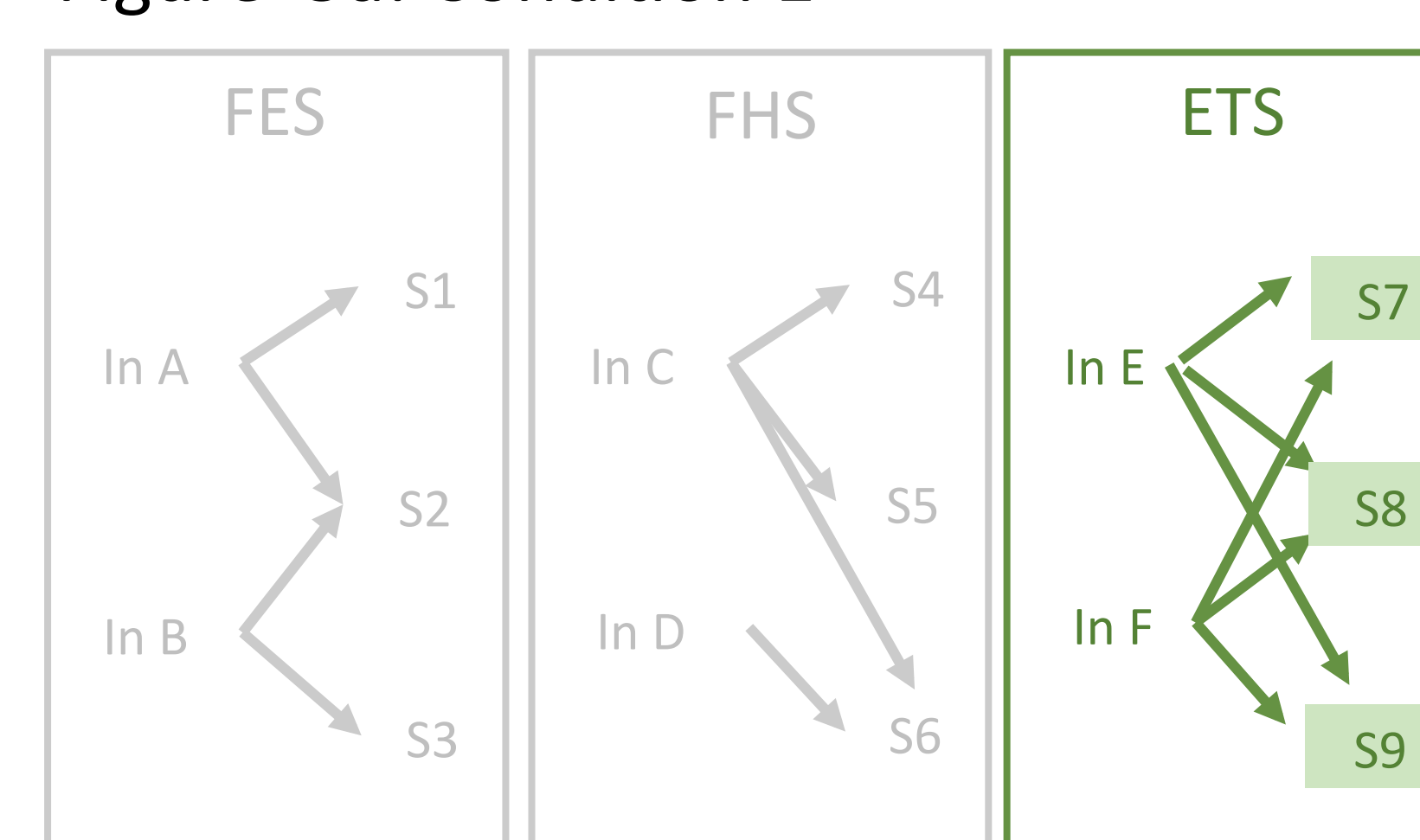
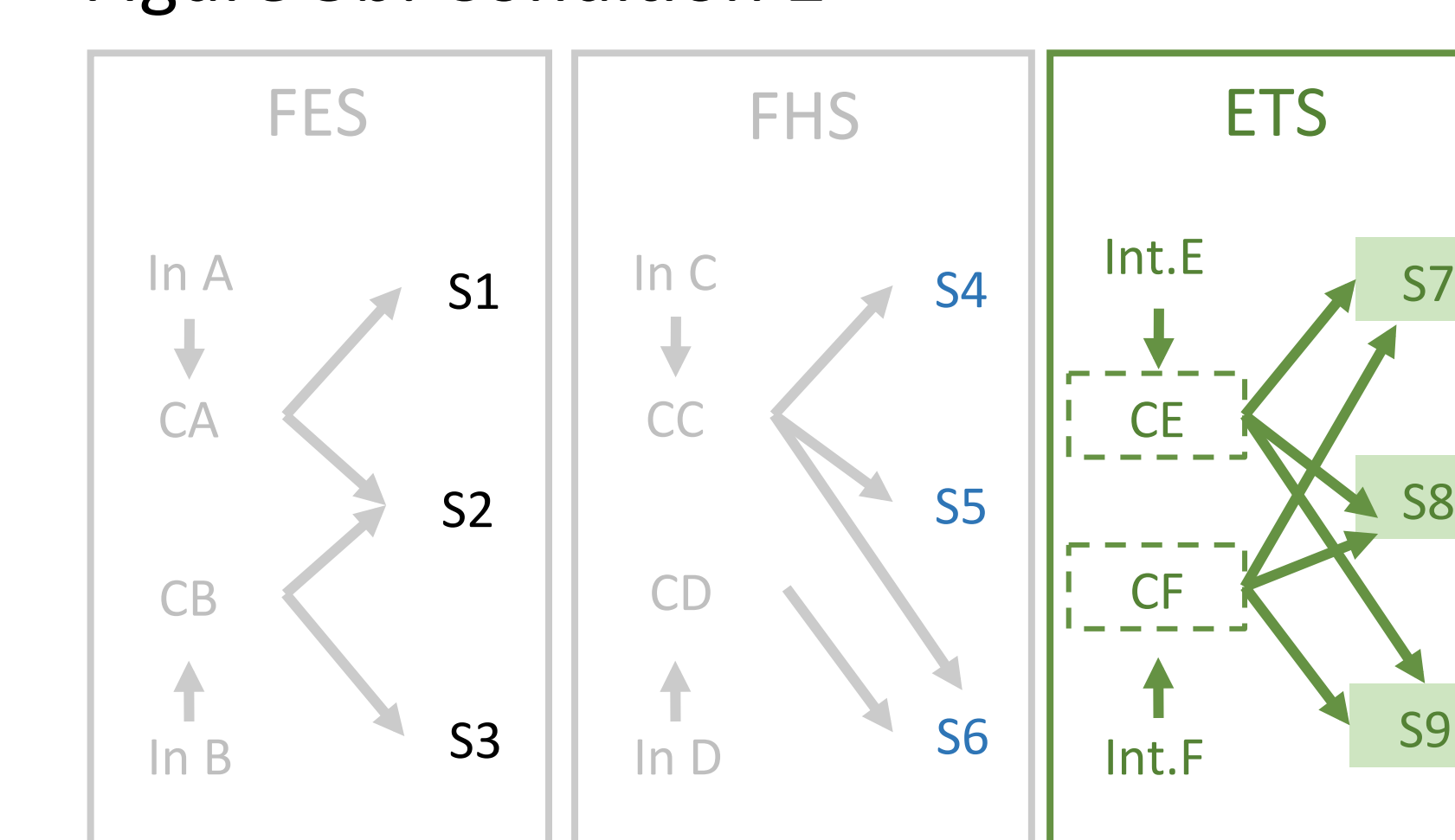Figure 5a: Condition 1   Figure 5b: Condition 2

Results and Discussion

(N=25 in each condition, all ≥ 90% correct after learning phase)

Table 1: Performance in Test phase (Mean % correct)

	Condition 1: Interventions target symptoms	Condition 2: Interventions target causes
Test case 1	99%	99% ns
Test case 2	94%	90% *
Test case 3	100%	84% *

Table 2: Search for information (Mean % & 95%CI)

	Condition 1: Interventions target symptoms	Condition 2: Interventions target causes
Test case 1	4% [0;8]	11% [5;16] *
Test case 2	91% [85;97]	86% [76;95] ns
Test case 3	43% [26;60]	71% [57;85] *

⇒ Participants search for information when it allows for a better choice (Test case 2 in both conditions & Test case 3 in condition 2)

Table 3: Search for causes (Mean % & 95%CI)

	Condition 1: Interventions target symptoms	Condition 2: Interventions target causes
Test case 1	1% [0;4]	9% [4;13] *
Test case 2	26% [13;39]	64% [52;77] *
Test case 3	38% [21;55]	69% [55;81] *

⇒ Participants search for causes when they assume that interventions target causes rather than symptoms (Test case 2 & Test case 3)
⇒ Participants search for causes when it allows them to pick a better intervention (Condition 2: Test case 1 vs. Test case 2 and 3)
⇒ Participants prefer to search for causes even when other symptoms would provide the same information (Condition 2: Test case 2)

Conclusion

People search for causal information when making an intervention choice when knowing about the cause(s) is helpful. They prefer causal information over knowledge of symptoms. Thus, causal explanations are used adaptively in decision making.

References

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