

DAVID W. GREEN & OTHERS

# C **OGNITIVE** **S**CIENCE

AN INTRODUCTION



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# Cognitive Science

An Introduction

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David W. Green and others

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## CHAPTER

# 1

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## Introduction

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The world of science, like that of art or religion, (is) a world created by the human imagination, but within very strict constraints imposed both by nature and the human brain.

(Jacob, 1988, p. 306)

### Outline

This chapter outlines some of the key concepts and issues in cognitive science and introduces you to the nature of this textbook. Cognitive scientists aim to understand the processes and representations underlying intelligent action in the world. They do so by building explicit models of these processes and testing predictions from them experimentally. Complete models involve at least three levels of description: the behavioral, the cognitive, and the biological. Given current knowledge, our examples of the discipline focus on the cognitive and behavioral levels. Our aim is to encourage you to participate in the debates and to provide you with some of the conceptual tools to do so.

### Learning Objectives

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After reading this chapter you should be able to:

- contrast everyday and scientific thinking
- characterize the discipline of cognitive science
- identify research strategies for the discipline
- understand the significance of the representational view of mind
- grasp the basic methodological requirements of the discipline
- appreciate the aims and goals of this text

### Key Terms

- 
- cognitive science
  - functionalism
  - information processing
  - levels of description
  - mental representation
-

Cognitive scientists are embarked on a collective and long-term enterprise to understand the mind scientifically. What does it mean to think scientifically about the mind? How does such thinking compare with everyday thinking about people? Please read the scenario in box 1.1 as we will be referring to it throughout this book with the aim of illustrating cognitive science. Hopefully, you will have no problem understanding what is going on, primarily because, like us, you have a sense of why people do what they do. As social agents, we need such a sense because we need to be able to plan our actions, predict what might happen in certain circumstances and be able to explain events in order to decide what actions to take. So, for example, Lucy, perhaps aware that her father would object to her visiting her friend, sought her mother's support. On overhearing Dad's objection, she tried to placate him with an offering of his favourite jam.

What matters to us as social agents is whether our knowledge of the social and physical world, and our methods for handling various problems, are sufficient to allow us to meet our practical concerns. We learn, or infer, the relationship between concepts and observations. Suppose, for example, the following morning, Lucy spoke to Dad without looking at him. Dad might infer that Lucy was angry with him, because when people are angry they either stare at one or look away. He might also infer that Lucy was angry because he did not relent. He based this inference on the fact that people get angry when they are thwarted. In everyday life, we do not go on to ask how such a capacity for inference is possible. In accounting for why she forgot where Granny went on holiday, Mom might say it was because she is forgetful. In everyday life, we do not go on to ask what is involved in remembering or in forgetting things. We rarely seek to explain the normal. We do not ask: how is it possible that Mom is able to read the letter? How is it possible that she was able to remember seeing the tray in the living room? We do not ask: how do we recognize a coffee pot or, assuming a dramatic staging of the scenario, distinguish Lucy's voice and face from Zara's voice and face? And yet these are most remarkable achievements! Clearly there are occasions when we do extend our accounts, such as when something unexpected happens or when things break down. Suppose Granny had a stroke and was unable to write. We would attribute her inability to the physical effects of the stroke rather than to some emotional cause. In our everyday explanations, then, we do (but perhaps not as much as we could) distinguish between what someone does and their motives or dispositions. Occasionally, we also appeal to possible physical factors. But our everyday accounts, however subtle, are particular rather than general. As part of our upbringing, we also learn certain methods for achieving our goals. Methods, for example, for coping with difficulties (e.g., ring the doctor if a fever has continued for a period of time). However, we do not generally consider whether a given method is both necessary and sufficient. It is whether or not it works that matters, for instance, given a headache, we may reach for the aspirin. The general point is this: our thinking and practical actions are determined by the goals we have in mind.



### Box 1.1 The scenario

This is a fictional conversation over breakfast between two adults, Mom and Dad, their teenage daughter, Lucy, and, their two and a half year-old daughter, Zara. It is set in a kitchen/living room. The phone rings.

Mom picks up the phone, listens, and says: "I'll get her. How's the coffee?"

Lucy: "Started." Lucy goes to phone.

Zara in high chair at the table, reaches forward toward milk carton, saying: "More milk, mommy!"

Dad: "Here's some milk."

Zara turns towards the cupboard, points and says, "Mommy, - ops!"

Mom: "Hm? What darling?"

Zara: "Pops! Pops!"

Mom: "Oh, can you get her some - I'm seeing to the toast."

Lucy: "I'm eating at Jane's tonight, Mom - OK?"

Dad: "I thought it was your homework evening."

Door bell rings.

Lucy: "I'll go."

Mom frowning: "She's worked every night, John."

Dad: "She didn't work last night. She sat in front of the TV."

Lucy: "For you, from Gran I think."

Mom struggling to open the parcel.

Zara: "Gran send me bear."

Mom: "That's right! Granny sent you your bear for your birthday, last month, didn't she?"

Mom goes out to the living room.

Dad: "Toast! Lucy! It's Etna in here."

Lucy opens the windows in the kitchen.

Lucy: "I'll make some more." Lucy discovers the toaster is broken. She makes toast heating the bread in a frying pan. Zara: bangs the table "Allgone! Gone!"

Dad: "Yes, you've eaten it up . . . cleared the bowl. Lucy are you pouring the coffee? Where's the butter? Can you bring it over? And the jam."

Lucy: "Anyone seen the tray?"

Dad: "It's not over here."

Mom comes back with scissors and opens the parcel.

Mom: "It's a jumper for Zara. Look, won't she look great!" Mom puts down the jumper and starts to read the letter enclosed. "She says she has fixed up something . . . what's this? 'nolinay'? Ah! 'holiday'! Granny's writing doesn't improve. 'I've fixed up a holiday with friends who have a yacht. We're sailing to the Polish port of (she spells out the letters) SZCZECIN. I've never been sailing before.' Where did she go last year? I've completely forgotten."

Lucy: "Mom, have you seen the tray?"

Dad: "The Grand Canyon. I remember the postcard she sent us." The cat comes in, stretches, and lies down.

Mom: "I just saw it in the living room."

Lucy comes across with the toast, butter, jam, coffee pot, and mugs on the bread board.

Dad: "Ah you little monster! My favourite jam. You still have to work tonight!"

...