

TESTIMONY

A PHILOSOPHICAL INTRODUCTION



JOSEPH SHIEBER

ROUTLEDGE



TESTIMONY

The epistemology of testimony has experienced a growth in interest over the last 25 years that has been matched by few, if any, other areas of philosophy. *Testimony: A Philosophical Introduction* provides an epistemology of testimony that surveys this rapidly growing research area while incorporating a discussion of relevant empirical work from social and developmental psychology, as well as from the interdisciplinary study of knowledge-creation in groups. The past decade has seen a number of scholarly monographs on the epistemology of testimony, but there is a dearth of books that survey the current field. This book fills that gap, assessing the strengths and weaknesses of all major competing theories. All chapters conclude with suggestions for further reading and discussion questions.

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A Philosophical Introduction

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First published 2015
by Routledge
711 Third Avenue, New York, NY 10017

and by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

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British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Library of Congress Cataloging in Publication Data

Shieber, Joseph.

Testimony : a philosophical introduction / Joseph Shieber.

pages cm

Includes bibliographical references and index.

1. Testimony (Theory of knowledge) I. Title.

BD238.T47S54 2015

121'.3--dc23

2014046901

ISBN: 978-0-415-82132-2 (hbk)

ISBN: 978-0-415-82133-9 (pbk)

ISBN: 978-1-315-69737-6 (ebk)

Typeset in Bembo

by Taylor & Francis Books

For my parents, who have given me more than I can ever hope to repay,
and for Lesa, who has brought me more than I could ever have thought
to deserve

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ACKNOWLEDGMENTS

I have been thinking about issues concerning testimony since my first semester as a graduate student at Brown University in 1997, when I first encountered C. A. J. Coady's and Lizzie Fricker's work in a seminar with Ernie Sosa. My 2003 dissertation at Brown, under the direction of Ernie Sosa, Jaegwon Kim, and Jim Van Cleve, involved a defense of a version of one of the views that I discuss under the heading of a priori presumptivism in Chapter 4 of this book.

However, I have since almost completely abandoned the views I defended in that 2003 dissertation, due in large part to my deepening engagement with empirical literature impinging on questions dealing with the epistemology of testimony. I have been presenting some of the arguments that appear in this book at least since the summer of 2009, when I sketched early versions of the basic ideas running through Chapters 2 and 6 at the 2009 International Summer School in Philosophy at the University of Cologne.

I owe thanks for helpful comments to audiences at that 2009 Cologne International Summer School, a symposium at the 2010 American Philosophical Association Central Division Meetings, a 2010 meeting of the Epistemology Discussion Group of the Greater Philadelphia Philosophy Consortium, the 2011 Epistemic Autonomy Conference at the Berlin School of Mind and Brain at the Humboldt Universität in Berlin, and the Georgetown University Philosophy Department 2011 Philosophy Department Speakers Series.

My thinking on these issues has benefited immeasurably from discussions with Fred Adams, Peter Baumann, Paul Faulkner, Lizzie Fricker, Sandy Goldberg, Alvin Goldman, Peter Graham, Thomas Grundmann, Ted Hinchman, Hilary Kornblith, Jennifer Lackey, Dave Matheson, Patrick Rysiew, Ernie Sosa, and Jonathan Weinberg.

I can't imagine a more collegial environment in which to do philosophy than the one created by my current and former colleagues in the Philosophy Department at Lafayette College, Peter Gildenhuys, Alessandro Giovannelli, Meghan Mastro, Owen McLeod, George Panichas, and Julie Yoo. To them I owe many thanks.

Finally, I owe the deepest debt of gratitude to Ben and Eileen Shieber, Will and Jonathan Shieber, Lesa Shieber, and Samuel Shieber.

Chapter 2 appeared, in somewhat different form, in Shieber (2012). Chapter 3 contains some material that previously appeared in Shieber (1999) and Shieber (2009a). Chapter 4 contains some material that previously appeared in Shieber (2009b) and Shieber (2010). Chapter 6 appeared, in somewhat different form, in Shieber (2013).

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1

INTRODUCTION

1.1 The Pervasiveness of Testimony

It is estimated that more than 500 million people watched the live television broadcast on the evening of July 20, 1969 as the first humans walked on the moon. Even as they watched, however, not all of the viewers believed that what they were watching was genuine.

In his autobiography, Bill Clinton relates a conversation he had with one such doubter, a local carpenter with whom he worked putting up prefab homes near Clinton's home in Arkansas:

The old guy worked me into the ground every day and shared a lot of his homespun wisdom and country skepticism with me. Just a month before, Apollo 11 astronauts Buzz Aldrin and Neil Armstrong had left their colleague, Michael Collins, aboard spaceship *Columbia* and walked on the moon, beating by five months President Kennedy's goal of putting a man on the moon before the decade was out. The old carpenter asked me if I really believed it had happened. I said sure, I saw it on television. He disagreed; he said that he didn't believe it for a minute, that "them television fellers" could make things look real that weren't. Back then, I thought he was a crank. During my eight years in Washington, I saw some things on TV that made me wonder if he wasn't ahead of his time.

(Clinton 2004, 156)

As Clinton's concluding sentence suggests, it would perhaps be wrong to tar such suspicions like those of the carpenter as utterly irrational. Many of the viewers of the moon landing would have been aware of Orson Welles's famous "War of

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the Worlds” radio hoax, perpetrated in the 1930s. And indeed, as the old carpenter quoted by Clinton noted, television producers were—even in the late 1960s—capable of creating remarkably realistic illusions.

In fact, in a talk given just a few months after the moon landing, in December of 1969, and reported on in the *New York Times*, Julian Scheer, NASA’s assistant administrator for public affairs at the time, sketched how it would have been possible for NASA to fake the landing. In his talk—admittedly intended as a sophisticated joke to mock flat-earthers and other skeptics—Scheer “narrated films showing what appeared to be the moon’s cratered crust outside a spacecraft window and astronauts walking on a bleak moonlike surface, loping about in one-sixth gravity and floating in raw space.” Though the movies “were almost indistinguishable from movies of the real thing,” they were actually “of simulations at space agency training facilities” (Wilford 1969, 30).

Nor is such skepticism unheard of today. A 2009 poll by the UK magazine *Engineering and Technology*, for example, suggested that fully 25 percent of the British public doubted that the moon landing ever occurred (*Daily Telegraph*, July 17, 2009). Each new milestone of space exploration—such as the Mars “Curiosity” Rover mission—invites new conspiracy theories to complement the theory that that first moon landing was a hoax.

The persistence of such conspiracy theories underscores just how much of the information that we receive depends on our trusting in sources of information. In the case of the moon landing, as the example of Bill Clinton’s story of the Arkansas carpenter demonstrates, trust in the television reports was not the only option. However, for all of those other than the astronauts who stepped on the moon themselves, trust is indeed the only option if one is to accept that humans walked on the moon.

Our knowledge of the moon landing, of course, is merely one example of a far more widespread phenomenon. Once we begin to analyze the information that we possess, it is likely that we will quickly determine that much—if not most—of it derives from something we read in a book, magazine, or newspaper, saw on the television, heard on the radio, gleaned from the internet, or learned from someone in our circle of friends or family. Indeed, even beliefs as central to our identity as those regarding our own name, where and when we were born, and our family history were acquired at second-hand, from others.

Furthermore, many of the most pressing issues facing contemporary societies today—including Ebola, global warming, the effectiveness of vaccinations, or whether or not to invade Middle Eastern countries on the basis of the presence of weapons of mass destruction—hinge on the question of when to trust testimony, and to what extent. To take the example of vaccinations, the current rise of childhood diseases previously thought to be virtually eradicated speaks to the real danger of too great a skepticism regarding expert testimony (cf. Specter 2009).

We don’t merely want to believe indiscriminately, however; presumably, we have an interest in having appropriate, but not profligate, trust in the testimony of

others. This is why Bill Clinton lumps in the old carpenter's "country skepticism" with "homespun wisdom": the skeptic certainly avoids the risk of being taken in by false or misleading information. This leaves us, however, in a quandary. Though certainly not indiscriminate in his acceptance of the testimony of others, the skeptic accepts *too little* information, since almost all information comes from sources in which he would need to trust. Once one resolves to trust the sources of information, however, one leaves oneself open to being misled.

What we need, then, is an account of when it is that recipients of testimony appropriately accept that testimony: when they achieve an acceptable balance between excessive skepticism and indiscriminate belief.

1.2 The Aim of this Book

1.2.1 *Accepting testimony and the Adequacy Goal*

In order to evaluate what it is that constitutes appropriate acceptance of testimony, it will be useful briefly to consider the aims of testimony—that is, the aims of testifiers in testifying and the aims of recipients in believing on the basis of testimony.

Of course, there are many goals that a testifier might pursue in performing a communicative action that purports to be an instance of testimony. The testifier might indeed be performing such an action at "face value," as it were: in other words, doing so in order to transmit information that the testifier herself believes to be accurate. But the testifier might also be attempting to deceive her interlocutor, or to pass the time, or to signal that she belongs to a certain group of like-minded people, etc. Or she might be testifying to something because she is paid to do so, like a press secretary or spokeswoman. The testifier might even be testifying to something as a way of convincing herself of its truth. And depending on the goal that the testifier is pursuing, her testimony might be a more or less reliable indicator of the truth of the matter about which she is communicating.

Just as testifiers have many goals in testifying, recipients of testimony may have many goals in accepting testimony. This is a fact that is seldom appreciated in discussions of testimony, but that makes it no less true. Of course, recipients often have an interest in accepting testimony because they want to believe true information, and testimony is a (potential) source of true beliefs. But recipients of testimony are only human; they are credulous and often *want* to believe. Part of the reason for this might be that recipients are under strong social pressure to conform, and that sharing a testifier's belief is a way of conforming with the testifier. A further part of the reason for this might be that humans are what we might term "informationally acquisitive"—they simply like to add new beliefs to the storehouse of beliefs that they already possess, and they add those beliefs often without submitting them to any sort of explicit review as to whether the beliefs are likely to be true (cf. Gilbert 1991). Furthermore, part of the reason for this might be

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that recipients of testimony at least sometimes believe testimony in the pursuit of better understanding testifiers.

It will be worthwhile to spend a moment considering this last point, because it impinges upon a number of interesting issues. Why should it be that recipients might accept a testifier's testimony because of a goal of better understanding that testifier?

First, it is plausible that we often use a working assumption that a testifier is speaking truly in order to help us better understand what a testifier is saying. Consider this example. Suppose, in noisy conditions, you see your friend looking at a large, hairless dog with huge fangs and a gaping maw. Your friend says something like, "That is a big, **stry** dog." Because of the noise, you weren't really able to hear the word "**ry**." However, you assume that your friend couldn't have said "hairy," because the dog is clearly hairless. So you assume that your friend said "scary," because the dog is an obvious terror. As this somewhat artificial example demonstrates, we often use the assumption that testifiers are saying something true as a way of grasping the content of what it is that the testifier is saying (cf. Marslen-Wilson 1981).

Of course, this by itself would not be sufficient to establish that recipients at least sometimes actually come to believe a testifier's testimony in the process merely of attempting better to understand the testifier. However, there is strong evidence to support the fact that it is hard to relinquish the assumption that a given communication is true once the content of the communication is grasped. Indeed, a number of experiments have substantiated the idea that, if experimental subjects are told that a piece of information that they've read and understood is false, those subjects then have a hard time relinquishing their belief in that information, despite having been explicitly told of its falsity (Gilbert 1991).

Taking these two propensities together—the propensity on the part of recipients to assume that testifiers are speaking truly as a strategy for understanding what the testifier is saying, and the general propensity to have trouble relinquishing an assumption that a given content is true, once one understands that content—we can appreciate why it might be that recipients could come to accept a testifier's testimony as a byproduct of merely attempting to understand what the testifier is trying to communicate.

If there are a number of goals that recipients might pursue in accepting testimony, however, this will have a bearing on our evaluation of the strategies, practices or mechanisms that recipients of testimony employ in determining whether to accept a given piece of testimony. For, depending on the goals under consideration, our evaluation might very well differ. If the goal, for example, is to maximize conformity, this will likely yield different rules for the acceptance of testimony than if the goal is to acquire information through testimony in ways that are conducive to acquiring knowledge.

In this book, we will focus on this latter goal: using strategies conducive to acquiring knowledge through testimony. Let's state this goal more precisely. Let's

define a person's *grounds* for a particular belief as the total truth-conducive support that belief has (cf. Goldberg 2007, 139). Furthermore, let's say that a person has *adequate* grounds—or, alternatively, *epistemically adequate* grounds—for a given belief that *p* just in case that person's grounds are sufficient to underwrite knowledge that *p* (if *p* is true). Given these characterizations, the goal that interests us is that of finding strategies of the acceptance of testimony that insure that recipients of testimony have adequate grounds for the beliefs they form on the basis of testimony. We'll call this the *Adequacy Goal*. In other words, what we'll be seeking to do in subsequent chapters is to determine which strategies, practices or mechanisms should govern a recipient's acceptance of testimony, under the assumption that our sole interest is the Adequacy Goal. (For another project that examines a wide variety of social epistemological questions from the point of view of a related goal, see Goldman 1999.)

It is important to emphasize that this formulation of the investigative goal for this book is an intentional simplification. The claim, in other words, is *not* that the sole interest of actual recipients in accepting testimony is according with the Adequacy Goal. Indeed, as we have just pointed out, just as there are a number of interests that testifiers may pursue in communicating testimony, there are a number of other interests that recipients might legitimately pursue in accepting testimony on the part of their interlocutors.

1.2.2 *Some remarks on the Adequacy Goal*

In subsequent discussions, then, we'll focus on evaluating a recipient's acceptance of testimony from the point of view of the aim to maximize the likelihood that the recipient believe a proposition only if that proposition is true. That is, we'll focus on when a recipient's acceptance of testimony is appropriate, under the assumption that our sole interest is the Adequacy Goal. A few points about this investigative emphasis on the Adequacy Goal are in order, however, before we proceed.

First, it is important to note that it is we, the theorists, who are adopting an evaluative stance with the Adequacy Goal in mind. That is, we can employ the Adequacy Goal in evaluating a certain recipient's believing on the basis of testimony, even if that recipient is not herself interested in the Adequacy Goal. To see this, consider an example. Suppose Betty has fallen in with a crowd of people who derive all of their conversational topics from reading articles in *The New York Times*, the *New Yorker*, and the *Economist*, as well as from reading non-fiction books that have been well-reviewed in *The Times Literary Supplement*. Betty doesn't care about whether her beliefs are true or not; she cares about being taken seriously by her new circle of friends. However, if we, in evaluating Betty's belief-forming strategy, come to find that accepting what one believes reads in *The New York Times*, the *Economist*, etc., accords with the Adequacy Goal, then we should say that Betty is behaving appropriately in accepting testimony from those sources—despite the fact that Betty herself isn't accepting testimony from those sources with the Adequacy Goal in mind.

Second, it is open that someone could accord with the Adequacy Goal if she forms her belief solely on the basis of information of which she has—or perhaps even could have—no conscious awareness. In other words, the Adequacy Goal as stated takes no position in the debate between internalists and externalists in discussions of justification or knowledge.

Third, someone can accord with the Adequacy Goal even in cases when they are not intentionally pursuing any belief-forming strategy or consciously following any explicit set of rules, but are rather forming beliefs on the basis of some unconscious cognitive mechanism of which they are wholly unaware. To see this, consider a neurotypical twelve-month-old who, in the company of her mother, is investigating a new and uncertain environment. The twelve-month-old will attend to emotional cues from her mother before approaching some new object; if her mother seems unconcerned, the infant will proceed to play with the object (Vaish and Striano 2004). The baby would thus seem to be acting on the belief that the new object is safe on the basis of her mother's lack of concerned affect, but this isn't a conscious strategy or set of rules that the baby is explicitly adopting; rather, the baby is hard-wired to respond in that way to her mother's affective reactions to stimuli that are, for the infant, unfamiliar. Furthermore, the infant's mechanism for forming such beliefs about the safety of new objects on that basis is, arguably, in accordance with the Adequacy Goal.

Finally, a focus on the Adequacy Goal is valuable because it allows us to avoid getting bogged down in debates about the nature of knowledge, wisdom, understanding, reason, justification, or any of the other phenomena of interest to professional epistemologists. All of these phenomena are undoubtedly worthy of exploration. However, for our purposes here, a focus on the Adequacy Goal will allow us consider the phenomenon of testimonial acquisition of belief without diluting our focus by considering those other topics. From here on out, then, unless otherwise specified, when we discuss “appropriate belief on the basis of testimony” or “appropriate acceptance of testimony,” we'll mean appropriateness *with respect to the Adequacy Goal*: the goal of believing in ways that conduce to acquiring knowledge.

1.2.3 Three constraints

Our subsequent discussion in the remainder of this book will conform to three constraints (cf. Lyons 1997). The first constraint concerns the existence of the phenomenon of appropriate acceptance of testimony, the second concerns what will count as satisfactory explanations of that phenomenon, and the third concerns the psychological realism of those explanations.

The purpose of this book will not be to argue against skeptics regarding the phenomenon of appropriate acceptance of testimony. Rather, given the pervasiveness of testimony in our cognitive lives, it seems reasonable, at least as a working hypothesis, to leave aside radical skeptical concerns. For this reason, our discussion will conform with the

Existence Constraint: Generally, when people believe on the basis of testimony, they are doing so appropriately.

Of course, our acceptance of the Existence Constraint need not be unshakeable. Should we find, in subsequent discussion, that there is no way to justify the Existence Constraint, then we may find it necessary to reject it. Its role as a constraint on the subsequent discussion, then, is intended to emphasize the centrality of the Existence Constraint, rather than its absolute unrevisability.

Furthermore, in considering the acquisition of information through testimony from the perspective of the Adequacy Goal, we are ruling out of consideration explanations of the appropriateness or inappropriateness of accepting testimony that appeal to conditions unrelated to the Adequacy Goal. For example, in the seventeenth century in England it was understood that it was appropriate to accept the testimony of a testifier of high social standing without further evidence that he (and it was always a he) was particularly reliable or honest with respect to the content of the particular testimony. Unless high social standing was actually connected to the truth-likelihood of an informant's testimony, however, such considerations would not be suitable for figuring in explanations of the appropriateness of accepting testimony from that informant.

In other words, our subsequent discussions will conform with the

Explanatory Constraint: An account counts as an explanation of why a recipient R's acceptance of testimony that p is appropriate in a given situation, just in case it demonstrates why it is that R's acceptance of p on the basis of testimony in that situation constitutes an instance of R's basing her belief that p on adequate grounds.

Of course, one might argue that there are many potential explanations for the appropriateness of accepting testimony. Recall, however, that we are limiting our assessment of the appropriateness of accepting testimony to an examination of appropriateness from the perspective of the Adequacy Goal. Given this limitation, the Explanatory Constraint follows.

Finally, in considering rules for the appropriate acceptance of testimony, it would seem crucial to keep in mind the limitations of the creatures who are subject to those rules: human cognizers. For this reason, we must keep in mind that, if we are to accord with the Existence Constraint, the account that we give according to the Explanatory Constraint cannot involve such rigorous standards that no—or only very few—human beings could actually comply with such standards. Given this, it is fitting to require that all satisfactory accounts of the appropriate acceptance of testimony accord with the

Psychological Realism Constraint: The reasoning or other computational processes that make it the case that a person's acceptance of testimony is

appropriate must be the kinds of reasoning or processes that human recipients of testimony actually employ or approximate.

In sum, what we desire from our theory of the appropriate acceptance of testimony is a theory that provides us with an explanation that accounts for how it is that actual, fallible humans can, through testimony, acquire adequate grounds for belief.

1.3 What is it to Base a Belief on Testimony?

In order for us to speak of a belief's being based on testimony, there are a number of conditions that must be fulfilled. Obviously, the belief must in fact be caused by testimonial transmission. Assuming that you have a prior knowledge of basic arithmetic, my telling you that $2 + 2 = 4$ does not thereby make that mathematical belief testimonially derived.

Mere causation, however, is not sufficient. If Sam, of whom you know nothing and whom you have never met, declares in his high, squeaky voice "I have a high, squeaky voice," it may well be that your belief that Sam has a high, squeaky voice is caused by Sam's utterance. Nevertheless, you would have formed that belief merely due to hearing Sam speak—regardless of the content of his statement. This suggests a further condition for a belief's being testimonially derived: a belief must not only be caused by testimonial transmission, but the fact that the belief has the content that it does must be causally related to the fact that the testimony in question has the content that it does.

Even still, these two conditions are insufficient as a characterization of testimonial derivation. Suppose that Sally has a strange psychological condition such that whenever anyone speaks of there being a rabbit or rabbits nearby she systematically mishears that there are *no* rabbits nearby. In that case, when one utters "There is a rabbit nearby" in Sally's presence, then Sally's belief that there is no rabbit nearby is caused by one's statement that there is a rabbit nearby, and that Sally's belief has the content that it does is related to one's statement about the nearness of a rabbit. Nevertheless, Sally's belief (that there is not a rabbit nearby) is not testimonially based, because the content of her belief is not appropriately semantically related to the content of the relevant testimony.

Thus, we have the following conditions for a

Testimonially Based Belief: R's belief that p is testimonially based on T's testimony that q (where p and q can, but need not, be identical) if, and only if, (1) R's belief that p is caused by T's testimony that q; (2) R's belief has the content that p is causally related to T's belief having the content that q; and (3) the information that p is conveyed to R by T's testimony that q.

In order to complete the account above, it will of course be necessary to explicate the notion of the conveyance of information employed in (3).

In order to think about how it is that information is conveyed in testimonial exchanges, we must first briefly consider how it is that information is expressed in verbal communication. In doing so, we will lean upon the work of Richard (1998).

Consider a case in which someone asserts the proposition expressed by

(1a) Joe wore a spiffy yellow tie yesterday.

In so telling you this, this person is conveying the information that

(1b) Joe wore a tie yesterday.

Thus, you would be acting properly were you to pass the information on to a further person thus: X said that Joe wore a tie yesterday.

That is, there can be distinct pieces of information p and q such that to convey or assert p is, *inter alia*, to convey q . Why is this the case? The sketch of an answer, sufficient for our purposes here, involves our recognizing that propositions are structured, so that, for example, to assert what (1a) expresses is to convey information relating to the following:

- (α) Joe
- (β) being spiffy
- (γ) being yellow
- (δ) being a tie
- (ϵ) the wearing relation

in such a way that one commits oneself to the existence of some x such that it had (β), (γ), and (δ), and such that (α) stood in the relation of (ϵ) to x .

But then it is obvious that to do this is also to commit oneself to there being some x such that it had (δ), and such that (α) stood in the relation of (ϵ) to x . Thus, in asserting the proposition expressed by (1a), one conveys the information expressed by (1b). More generally, we can state that there is a relation between pieces of information, determined by their structure and constituents, such that if someone asserts p , and p bears this relation to q , that someone conveys the information that q .

Furthermore, there may be additional information going beyond the literal meaning of an utterance that may be conveyed by an assertion. Consider the following exchange introduced by Grice in “Logic and Conversation” (Grice 1989, 32):

A: I am out of petrol.

B: There is a garage around the corner.

Grice suggests that the context requires that one—and, particularly, that A—understand B as saying that there is a garage nearby that is open and well-stocked with gasoline. Now consider C, who comes along in time only to see two acquaintances standing beside a parked car and to hear B say “There is a garage around the corner.” C understands merely that there is a garage nearby, and does not derive the additional information that it is open and well-stocked with gasoline from B’s utterance. In other words, the context of utterance can provide A with the resources to glean additional information from B’s assertion, over and above the literal meaning of that assertion. Assuming that A’s uptake of that information is automatic, and the computation upon which that uptake relies is unconscious, this could count as an instance in which B’s statement has conveyed to A that the garage nearby will supply A with gasoline.

Note that the notion of information conveyance employed in the third component of our account of testimonially based belief, (3), will depend on sub-personal, sub-doxastic, computational mechanisms of the recipient R of T’s testimony, and is thus not intended to preclude the possibility that very young children could have testimonially based beliefs. Indeed, given the rapid pace of knowledge acquisition in the earliest stages of human life and the epistemic dependence of very young children on their linguistic and proto-linguistic interactions with the adults around them, it would seem impossible to deny that many of a child’s earliest beliefs will be testimonially derived.

1.4 Defining Testimony: Some initial distinctions

1.4.1 *Natural vs. formal testimony*

Before examining strategies for accepting testimony that accord with the Adequacy Goal, it would be useful to specify exactly which phenomenon is being captured under the rubric of “testimony.”

As it is commonly used, the term “testimony” picks out a more circumscribed category: when one generally hears the term “testimony,” it is usually in the context of either legal or religious testimony. In the latter case, testimony arguably involves not an attempt to transmit information as much as it does a fervent expression of faith—in the hope that that faith might spark, or strengthen, the faith of the recipient of the religious testimony. In the former case, legal testimony, the circumstances in which such testimony can occur are specified in detail by the laws of whichever country that testimony is given. Furthermore, in the case of legal testimony there are generally detailed specifications as to who may testify—whether they are testifying, for example, as an eyewitness, a character witness, or an expert witness—and there are generally legally specified punishments to prevent witnesses testifying to something they know to be false.

As will be seen shortly, the term “testimony” in this book is intended to have broader scope. Rather than referring to these more circumscribed, narrower

phenomena, the term as it is employed here is intended to refer to a broader category encompassing as many acquisitions of information on the basis of linguistic communication as possible. The goal in casting our net so widely is to make the phenomenon under investigation as pertinent—and thus as interesting—as possible. To distinguish between the more circumscribed notions of testimony, such as those involved in legal or religious contexts, and the broader notion with which we will be concerned, we might speak of the circumscribed phenomena as constituting instances of “formal testimony,” while the broader notion might be termed “natural testimony.” Unless otherwise specified, the discussion here will largely be concerned with natural testimony.

1.4.2 Testimony as speech act vs. testimony as source of information

There are many approaches that one might take in attempting more precisely to specify the phenomenon of natural testimony. Perhaps the most dominant approach in the literature seems to take as its model the strategy used in linguistics to specify certain uses of language as *speech acts*.

A speech act, to borrow a formulation from the philosopher J. L. Austin, who first introduced the notion, is a way of doing things with words (Austin 1962). For example, in the proper context, when spoken by a person with the requisite authority, the words “I now pronounce you man and wife” do not simply describe the action of the speaker, but rather constitute the action of that speaker. By speaking those words in an appropriate context, a properly licensed officiant can marry two people who, before those words were spoken, were unmarried.

As the example of marrying would suggest, we can specify speech acts on the basis of (1) the action performed; (2) particular linguistic formulae, if any, that are typically used to perform that action (for example, “I now pronounce you ...”); (3) the context required for the speech to succeed in accomplishing the action; and (4) any conditions that speakers, or recipients, must meet in order for the speech to succeed in accomplishing the action.

Using speech act theory as a model, then, one approach to specifying the phenomenon of natural testimony would involve characterizing a speech act of testifying. Let’s call this the “Speech Act Model” of specifying testimony. A characterization of testifying on the Speech Act Model, then, would involve specifying the action performed in testifying, any linguistic markers characteristic of that action, the contexts in which the action can occur, and any conditions on speakers or audience on which the success of the speech act of testifying is contingent.

In contrast to this speech act approach, an alternative strategy would be simply to focus on the function of testimony. Fundamentally, natural testimony serves to transmit—and, in the case of recorded testimony, whether in print or in any other sort of medium, to preserve—information by means of communicating content. Thus, one might attempt to specify the phenomenon of testimony by