Metadata of the chapter that will be visualized online

Chapter Title	Exploring the Representation of Causality Across Languages: Integrating Production, Comprehension and Conceptualization Perspectives	
Copyright Year	2020	
Copyright Holder	Springer Nature Switzerland AG	
Author	Family Name	**Bellingham**
	Particle	
	Given Name	**Erika**
	Suffix	
	Division	Department of Linguistics
	Organization	University at Buffalo
	Address	Buffalo, NY, USA
	Email	ebelling@buffalo.edu
Author	Family Name	**Evers**
	Particle	
	Given Name	**Stephanie**
	Suffix	
	Division	Department of Linguistics
	Organization	University at Buffalo
	Address	Buffalo, NY, USA
	Email	saevers@buffalo.edu
Author	Family Name	**Kawachi**
	Particle	
	Given Name	**Kazuhiro**
	Suffix	
	Organization	National Defense Academy of Japan
	Address	Yokosuka, Japan
	Email	kazuhirokawachi@gmail.com
Author	Family Name	**Mitchell**
	Particle	
	Given Name	**Alice**
	Suffix	
	Organization	University of Bristol
	Address	Bristol, UK
	Email	alice.mitchell@bristol.ac.uk
Author	Family Name	**Park**
	Particle	

	Given Name	**Sang-Hee**
	Suffix	
	Organization	University at Buffalo
	Address	Buffalo, NY, USA
	Email	sangheep@buffalo.edu
Author	Family Name	**Stepanova**
	Particle	
	Given Name	**Anastasia**
	Suffix	
	Organization	University at Buffalo
	Address	Buffalo, NY, USA
	Email	astepano@buffalo.edu
Corresponding Author	Family Name	**Bohnemeyer**
	Particle	
	Given Name	**Jürgen**
	Suffix	
	Organization	University at Buffalo
	Address	Buffalo, NY, USA
	Email	jb77@buffalo.edu

Abstract

We present three new studies into the representation of causality across languages and cultures, drawing on preliminary findings of the project *Causality Across Languages* (*CAL*; NSF Award # BCS-1535846 and BCS-1644657). The first is an examination of the strategies that speakers of different languages employ when verbalizing causal chains in narratives. These strategies comprise the output of decisions concerning which subevents to represent specifically, which to represent in an underspecified manner, and which to leave to nonmonotonic inferences such as conversational implicatures. The second study targets the semantic typology of causative constructions. We implemented a multiphasic design protocol that combines the collection of production data with that of comprehension data from a larger number of speakers. Goodness-of-fit judgments were collected based on an eight-point scale. We found a strong main effect of language and of domain of causation (physical vs. psychological vs. speech act causation); in contrast, the involvement of an intermediate event participant in the causal chain did not exert a significant effect. The third study investigates whether culture modulates the effect of intentionality on nonverbal attributions of responsibility. A linear mixed effects regression model indicated a significant interaction between intentionality and population, in line with previous findings by social psychologists. These studies represent the first large-scale comparison of how speakers of different languages categorize causal chains for the purposes of describing them.

Keywords (separated by “-”)	Causal chain - Directness - Domain of causation - Iconicity - Intentionality - Responsibility attribution - Semantic typology - Underspecification

Chapter 3
Exploring the Representation of Causality Across Languages: Integrating Production, Comprehension and Conceptualization Perspectives

Erika Bellingham, Stephanie Evers, Kazuhiro Kawachi, Alice Mitchell, Sang-Hee Park, Anastasia Stepanova, and Jürgen Bohnemeyer

Abstract We present three new studies into the representation of causality across languages and cultures, drawing on preliminary findings of the project *Causality Across Languages* (*CAL*; NSF Award # BCS-1535846 and BCS-1644657). The first is an examination of the strategies that speakers of different languages employ when verbalizing causal chains in narratives. These strategies comprise the output of decisions concerning which subevents to represent specifically, which to represent in an underspecified manner, and which to leave to nonmonotonic inferences such as conversational implicatures. The second study targets the semantic typology of causative constructions. We implemented a multiphasic design protocol that combines the collection of production data with that of comprehension data from a larger number of speakers. Goodness-of-fit judgments were collected based on an eight-point scale. We found a strong main effect of language and of domain of causation (physical vs. psychological vs. speech act causation); in contrast, the involvement of an intermediate event participant in the causal chain did not exert a significant effect. The third study investigates whether culture modulates the effect of intentionality on nonverbal attributions of responsibility. A linear mixed effects regression model indicated a significant interaction between intentionality

AQ1
E. Bellingham · S. Evers
Department of Linguistics, University at Buffalo, Buffalo, NY, USA
e-mail: ebelling@buffalo.edu; saevers@buffalo.edu

S.-H. Park · A. Stepanova · J. Bohnemeyer (✉)
University at Buffalo, Buffalo, NY, USA
e-mail: sangheep@buffalo.edu; astepano@buffalo.edu; jb77@buffalo.edu

K. Kawachi
National Defense Academy of Japan, Yokosuka, Japan

A. Mitchell
University of Bristol, Bristol, UK
e-mail: alice.mitchell@bristol.ac.uk

E. A. Bar-Asher Siegal and N. Boneh (eds.), *Perspectives on Causation*,
Jerusalem Studies in Philosophy and History of Science,
https://doi.org/10.1007/978-3-030-34308-8_3

and population, in line with previous findings by social psychologists. These studies represent the first large-scale comparison of how speakers of different languages categorize causal chains for the purposes of describing them.

Keywords Causal chain · Directness · Domain of causation · Iconicity · Intentionality · Responsibility attribution · Semantic typology · Underspecification

3.1 Introduction

In this chapter we provide an overview of the goals and methodologies of the international collaborative research project *Causality across languages* (CAL). CAL investigates the extent to which the representation of causality in language and thought is variable across languages. To this end, we have been gathering data on how causality is represented in language and thought from a typologically, genealogically and areally diverse range of populations. Eventually we also plan to investigate to what extent these verbal and nonverbal datasets are predictive of one another. Such an investigation can take one of two directions or perspectives, both of which we believe should eventually be explored:

Perspective I: Look for naturally occurring data on the verbal and nonverbal representation of causality in different communities. To compare such datasets, one then requires a set of criteria for the diagnosis of representations of causality and a standard of comparison: some idea of the properties in which representations of causality might differ from one another.

Perspective II: Start out from a set of ideas of the dimensions along which representations of causality in language and thought might vary across populations, encode these in a set of scenarios, and study how members of different cultural and speech communities encode these scenarios and reason about them when given appropriate tasks.

We focus on the second perspective. However, either perspective introduces a paradox: it presupposes assumptions regarding which causal chain properties are relevant in the representation of causal chains across languages. To initiate this investigation it is necessary to start with a set of properties we assume to be relevant, yet at the same time, discovering such a framework of variables is one of the principal goals of cross-cultural research on the representation of causality. We believe that the only solution to this paradox is an approach that starts out from a set of assumptions that is maximally informed by the available cross-cultural and cross-linguistic literature and then revises these assumptions continuously on the basis of the emerging evidence in the course of the investigation.

In this spirit, we present here a set of causal chain properties gleaned from previous cross-linguistic research, along with three case studies whose design manipulates these properties as independent variables in both linguistic research and

research on nonverbal cognition. It should be noted that the findings of these studies are preliminary. Of greater significance is the innovative methodology discussed here. While our findings are promising, the methodological contribution of this research is the central concern of this chapter. Section 3.2 describes the causal chain properties under investigation (a set of independent variables with two or more possible values), and the representation of different combinations of variable values in our video stimuli. In Sect. 3.3, we provide three case studies: cross-linguistic experiments designed around these stimuli to investigate different aspects of the conceptualization and verbal representation of causality. Section 3.4 reflects on the causal chain properties and stimulus design in light of our experience in the three experiments: we discuss the aspects which ran smoothly, the design limitations we uncovered, and the improvements we will implement for future investigations.

3.2 A Study Design for Cross-Population Research on Causal Language and Thought

In this section, we introduce the framework of independent variables (causal chain properties) that the CAL studies have been designed around, and describe the stimuli we have created to represent different combinations of these independent variables.

A comparison of multiple languages or cultures necessitates the use of concepts that serve as standards of comparison. The first validity threat faced by any cross-cultural or cross-linguistic research is the potential bias introduced by these notions. The risk that these notions are biased toward the categories and concepts of the cultural and linguistic communities most familiar to the researchers must be minimized. For the purposes of cross-population research into representations of causality, this means first of all that no notion of causality that is specific to the members of certain cultural and linguistic communities – e.g., to speakers of 'Standard Average European' languages – should be imposed on the study populations. In addition, the same kind of bias must also be avoided in the definitions of the independent variables of the study designs. The dilemma raised by this requirement is that it is impossible to know whether certain notions are applicable to particular languages and cultures without studying the representation of the particular conceptual dimension in these languages and cultures and comparing the results to those obtained from members of other populations.

There is to date no solution to this dilemma that is universally or at least standardly accepted among cultural anthropologists, social psychologists, and linguists. All proposed solutions continue to be subject to (sometimes intense) controversy. However, we believe we can assume that at least this much is standardly agreed upon in the social and behavioral sciences: that it is crucial to maintain a careful distinction between the **emic** concepts of particular cultural and linguistic communities and the **etic** concepts a given study treats as independent of individual languages and cultures in terms of its design (e.g. Harris 2001). The terms 'emic'

and 'etic', abstracted from 'phonemic' and 'phonetic', have been standard in cultural anthropology and anthropological linguistics since (Pike 1967). They are used to distinguish two perspectives on cultural and linguistic phenomena: the emic perspective, which classifies the phenomena in the way members of the particular community do, and the etic perspective, which strives to classify the same phenomena in a matter that is valid for cross-cultural and crosslinguistic comparison.

In the remainder of this section, we lay out concepts of causality and the properties of causal chains that we treat as strictly etic notions. Specifically, we investigate the cognitive and verbal representations of complex events in members of different populations under the understanding that these complex events instantiate various different types of causal chains in a purely etic sense. That is to say, we do not make the claim that these complex events are conceptualized as causal chains emically according to whatever folk theories of causality the members of the different populations might have (if any). We do, however, hope that the research based on the **etic grid** of variables laid out below can ultimately help discover emic differences in the conceptualization of causality. The case study presented in Sect. 3.3.3 has indeed uncovered results that are at least suggestive of such emic differences.

A **causal chain** is a complex event consisting of minimally a causing subevent and resulting subevent, with a causal relation between the two subevents.[1,2] But what is a causal relation? The criteria that are used for inferring causality have been the subject of much research in the social and behavioral sciences and philosophy. We do not commit to a single monolithic concept of causality, but consider the possibility that causal inferences are informed by a cluster of properties (spatiotemporal contiguity; probabilistic dependence; counterfactual dependence; beliefs about underlying regularities; etc.) that do not necessarily all co-occur ('causal pluralism'; cf. Anscombe (1971) and Heider and Simmel (1944), *inter alia*; cf. Grimshaw (2000) for a summary). In order to simplify the present study, we include only scenarios that meet all of these properties.[3]

The remainder of this section describes the particular dimensions of semantic variation in causal chains (the independent variables) around which our studies are designed, and the representation of different combinations of these variables in video stimuli.

[1] When we define a causal chain in terms of a series of causally related events (cf. Davidson (1969), Parsons (1990), and Croft (1998)), we are well aware of an alternative perspective which centers around force dynamic interaction (Talmy 2000, 1988). Both of these approaches have been informing our work, although the complex event view has been more central.

[2] The term 'subevent' refers to an event that is part of another event. We treat causal chains as complex events that have proper parts that are events in their own right and thus subevents.

[3] One exception to this is scenarios involving 'letting dynamics', which we explore as a variable in a supplementary set of stimuli, as described in Sect. 3.2.1.

3.2.1 *The Causal Chain Properties Under Consideration*

Our study is designed to focus on four major dimensions of semantic variation in causal chain types: 'mediation', 'participant type', 'participant behavior' and 'resulting event type'. (We focus on 'resulting event type' rather than causing event type for the reason that existing literature suggests that resulting event type matters (cf. Smith 1978). Additionally, most causal constructions do not specify causing events.) Each dimension of variation can be broken down into one or more variables, and different combinations of these variables are represented in video stimuli. An additional dimension ('force dynamics') is explored in a supplementary set of video stimuli.

3.2.1.1 Mediation

Mediation is one dimension of causal chain complexity, measured in terms of the number of causal chain participants. There is no real world limitation on the number of participants or the number of events in a causal chain, however we restrict the domain of our study to include only causal chains involving 2–4 participants operating in distinct positions within the chain. One participant is the initiator of the causal chain (the **causer**), one is the finally affected participant (the **affectee**), and (in chains with 3–4 participants) the remaining participants are involved in intermediate segments of the causal chain. Following Bohnemeyer et al. (2010), we consider both 'unmediated' causal chains, which involve only two participants (a **causer** and an **affectee**), as well as causal chains which also incorporate one or two intermediate participants ('mediated' causal chains). An intermediate participant does not initiate the causal chain, nor are they the finally affected participant in the causal chain: the actions of the initial participant (the **causer**) affect the intermediate participant in some way, and this in turn causes the resulting event, in which the final participant in the causal chain is affected. The intermediate participant could be human (in which case we call it the **intermediator**),[4] or it could be an inanimate **instrument** used by either the **causer** or the **intermediator**. We have broken mediation down into two binary variables (features): PRESENCE OF INTERMEDIATOR and PRESENCE OF INSTRUMENT (unmediated clips lack both PRESENCE OF INTERMEDIATOR and PRESENCE OF INSTRUMENT).

[4]Note that this term is used by some authors to denote the finally affected participant in the causal chain (human or inanimate), or the finally affected human participant in the causal chain. For Dixon (2000), the **intermediator** is the original A argument in the pre-causativized version of the clause. As we are defining our variables in terms of the *etic* properties of causal chains, rather than the *emic* properties of causative descriptions, this definition is not appropriate. We distinguish **intermediator**, an intermediate human participant, from **affectee**, the final participant (human or non-human) in the causal chain.

Mediation is closely related to the concept of **directness of causation**. Directness of causation is frequently cited as the contrasting semantic feature between two different causative constructions within a language (e.g. Comrie (1981), Dixon (2000), Shibatani and Pardeshi (2002), Wolff (2003)), however there is considerable variation in how directness is defined (see Escamilla (2012) for an overview). Bohnemeyer et al. (2010) propose that directness of causation can be divided into three dimensions: mediation (as defined above), spatio-temporal contiguity of causing and resulting subevents, and force dynamics (letting versus causing, cf. Talmy (2000)). Spatio-temporal contiguity was excluded as a dimension of variation in the present study design, see Sect. 3.2.2 for discussion. Force dynamics (letting versus causing) is included as a supplementary dimension of variation, discussed in Sect. 3.2.1.6. In Sect. 3.3.1, we discuss the concept of directness further, proposing an analysis whereby directness is conceptualized as a function of *all* semantic predictors of causal chain complexity.

3.2.1.2 Participant Type

Any type of entity in the real world could potentially participate in a causal chain, however we restrict the domain of our study to include only human, inanimate, or natural force participants. Each causal chain participant in our study is filled by a restricted set of participant types. We define **control** as the ability of initiate (partial control) and terminate (total control) an action at will. We consider only human or natural force causers: human causers are potentially controllers (although they do not always have control over their actions, they have the potential for control), and natural forces (e.g. the wind, a wave, fire) are non-controlling causers/instigators, while inanimate participants lack the wherewithal for control or non-controlled instigation of a causal chain. We do not consider animals or 'animate objects' (machines/robots) (see Wolff et al. (2009) for experimental evidence of variation in the treatment of 'energy generating' inanimate causers cross-linguistically). As described in Sect. 3.2.1.1, intermediate participants are already divided into intermediators (human), and instruments (inanimate). Affectees can be human or inanimate. We do not consider any instances of natural forces as intermediators, instruments or affectees. Besides simplifying the design of the study, an additional motivation for excluding other types of causal chain participants is the ability to clearly and unambiguously represent the participants in video stimuli. The dimension of participant type can be captured in two variables: **causer type** (HUMAN or NATURAL FORCE), and **affectee type** (HUMAN or INANIMATE).

3.2.1.3 Degree of Participant Autonomy

This dimension incorporates notions of intentionality and control (as defined above) into a fine-grained classification of the degree of participant autonomy. It is intricately connected to other variables such as the 'domain' of causation (cf. below).

Human causers prototypically possess the highest level of autonomy. They are conceptualized as potentially acting not as a result of any external event/stimulus, but as independently initiating the event in their own mind. We distinguish two levels of **causer autonomy**: INTENTIONAL, and UNINTENTIONAL.[5] Human intermediators and human affectees on the other hand do not initiate the causal chain, and by definition their involvement in the causal chain has a cause external to themselves (i.e. the causing subevent). There are a number of different ways they might interact with the preceding subevent, each of which generates a different degree of autonomy for the intermediator/affectee.

The highest level of autonomy that a human intermediator/affectee can hold is to respond intentionally to some external stimulus, which compels them to act by some (variable) degree. In our stimuli, this often takes the form of a request or directive (speech act causation) from a human causer. We recognize that the degree to which a person is compelled to act by a speech act (i.e. the degree of autonomy they possess in deciding whether or not to act) is highly variable, and presumably depends on the power dynamics between the two individuals (and whether there are perceivable consequences for not complying with the request/directive). However we suggest that generally the level of autonomy a intermediator/affectee has in intentionally responding to a directive/request is greater than that when responding unintentionally to some other external stimuli/physical forces. Our stimuli also include several scenarios in which the intermediator/affectee responds *intentionally* but in response to a non-speech act event. These are listed in (1).

(1) a. It is raining$_{CR}$, and so a man$_{IM}$ opens an umbrella$_{AF}$.[6]
b. A huge wave$_{CR}$ is approaching, and so a man$_{AF}$ runs away.
c. A woman$_{CR}$ is singing very loudly and out of tune, and so a woman$_{AF}$ covers her ears and leaves.

Human intermediators and affectees may also act reflexively, in response to some external stimulus. This could potentially involve a huge range of different external stimulus types (e.g. visual, auditory, tactile, olfactory...), however we restrict these possibilities to physical contact, unexpected loud noises, and visual stimuli which generate an (at least partially uncontrolled) urge to act, e.g. laughing in response to someone pulling a funny face, or yawning in response to someone else yawning. The force with which physical contact is made varies across our stimulus scenarios: in some cases it is so great that the intermediator/affectee is propelled purely by the momentum of the causing event (and does not act in any additional way), and in other cases the force is weaker and they are startled by it. We assume that intermediators/affectees who are physically propelled have the least autonomy, less than intermediators/affectees who act reflexively, or intentionally in response to some external stimulus.

[5] Cf. Sect. 3.3.3.1 for discussion of a further breakdown of causer intentionality into 'intention to action' and 'intention to outcome'.

[6] CR, IM and AF stand for 'causer', 'intermediator' and 'affectee' respectively.

Natural force causers and inanimate affectees are each restricted to a single possibility for this dimension: we assume that intentionality is not a relevant dimension for a natural force causer, and that inanimate affectees can only be involved in the causal chain by being physically impacted. Hafeez (2018) presents a detailed analysis of intentionality, volitionality and control in Urdu (Indo-Aryan; India and Pakistan) based on the CAL Clips. The clause structure of Urdu and other Indo-Aryan languages is sensitive to these variables in two aspects: case alternations on causer and intermediator NPs and light verb selection in complex predicates.

3.2.1.4 Domain of Causation

Related to both participant type and degree of participant autonomy, the **domain of causation** variable is intended to capture the potential impact of domain-specific knowledge and conceptualizations in representations of causality. Quite a few such distinct domains have been suggested in the anthropological and psychological literature. However, in the design of the CAL Clips, we restricted ourselves to a broad distinction between PHYSICAL CAUSATION and NON-PHYSICAL CAUSATION, where the latter can be broken down further between PSYCHOLOGICAL CAUSATION and SPEECH ACT CAUSATION. In the CAL Clips, all instances of PHYSICAL CAUSATION involve force interactions in the sense of Classical Mechanics: pushing events, ballistic collisions, falling events, events of separation in material integrity (cutting and breaking), and throwing actions. We did not include thermodynamic, electrodynamic, or chemical interactions, to name just the most obvious conceivable additional subdomains.

In PHYSICAL CAUSATION, the intentionality of the affectee or intermediator is generally irrelevant. This is potentially different in PSYCHOLOGICAL CAUSATION, which we define as a causal chain one link of which is a cognitive state change in the affectee or intermediator. The response may be largely an involuntary reflex, as when the affectee/intermediator is startled or scared, or may involve a decision on the affectee/intermediator's part, e.g., a decision to leave in order to avoid continued exposure to an unpleasant stimulus.

SPEECH ACT CAUSATION can be understood as a special case of PSYCHOLOGICAL CAUSATION. Here, the causal link between causer and affectee/intermediator is a communicative act. This entails that the affectee/intermediator carries out the caused action with some autonomy: while their response may be involuntary in the sense that they did not initiate the causal chain, it is nevertheless typically intentional and controlled.

Beyond PHYSICAL CAUSATION, PSYCHOLOGICAL CAUSATION, and SPEECH ACT CAUSATION, other domains in which the conceptualization of causality is potentially subject to domain-specific knowledge and folk theories include social causation (involving collective agency) and biological causation. We decided to disregard these in the design of the CAL Clips in the interest of keeping the stimulus set small.

3.2.1.5 Resulting Event Type

We distinguish three kinds of resulting events. The final event in the causal chain can be a physical or psychological state change (e.g. an egg breaking, a human sitting), a location change (e.g. a ball flying out the door, a person leaving the room), or a process[7] (e.g. a swing swinging back and forth). This can be captured in a single categorical variable (resulting event type) with three levels: STATE CHANGE versus LOCATION CHANGE versus PROCESS. Resulting event type is recognized by Dixon (2000) as a parameter relevant to the applicability of causative constructions in some languages. Note that this dimension interacts with **degree of participant autonomy**. In the case of human affectees who are not physically propelled, the resulting event (STATE CHANGE/LOCATION CHANGE/PROCESS) must be preceded by some psychological change in the Affectee (e.g. a decision to act, or being startled).

An additional resulting event type is considered in our supplementary stimuli: **projectile breaking**. Here the affectee changes state (breaks) as a result of impact with a surface following projectile motion (and the projectile motion occurred as a result of the causer/intermediator's action). In one example of a PROJECTILE BREAKING clip, a woman (the causer) pushes a man (the intermediator), he drops the plate he is holding to the floor, and the plate shatters upon contact with the floor. In the initial stimulus design, we did not differentiate between change of state and projectile breaking as distinct resulting event types. In piloting, however, we observed that descriptions of these clips often patterned quite differently from clips in which the affectee's state change occurred as a direct result of contact with the intermediator/instrument/causer. Descriptions of scenarios involving projectile motion would typically encode more subevents, and the surface seemed to be treated almost like an additional participant in the causal chain.

3.2.1.6 Letting Dynamics

Talmy's force-dynamics framework (Talmy 1988, 2000) conceptualizes causation as one type of force-dynamic interaction between entities. Other types of force-dynamic interactions (such as letting, helping, hindering, preventing, etc.) differ from causation and from each other with respect to the amount and direction/tendency of (not necessarily physical) force exerted by each entity. The force-dynamic approach focuses on interactions between two entities (an 'antagonist' acting upon an 'agonist': in our terms, a causer acting on a intermediator or affectee,

[7] "We use the term 'process' in the sense of von Wright (1963) and Mourelatos (1978), i.e., for dynamic situations that do not involve state change. In this usage, it is more or less synonymous with (Vendeler 2005) 'activity'. We prefer 'process' to avoid misinterpretations to the effect of controlled actions. All 'processes' in the CAL Clips are either externally caused (a swing swinging) or, at least by default, conceptualized as involuntary and uncontrollable (a person sneezing, yawning, or laughing)."

or a intermediator acting on an affectee, depending on which link in the causal chain is considered).

In the case of causation, the agonist and antagonist are exerting force in opposite directions: the agonist has a tendency towards remaining in the same state or location and the antagonist has a tendency towards (the agonist's) motion/change. The force exerted by the antagonist is greater than that of the agonist, and so causation occurs. In the case of letting, the agonist has a tendency towards movement/change, and the antagonist is impinging on the agonist and preventing it from changing/moving. The antagonist then ceases to impinge on the agonist (by removing a blockage or restriction), and the agonist fulfills its inherent tendency.

Letting versus causation was explored as a variable in Bohnemeyer et al. (2010), although only scenarios involving gravity as the inherent tendency of the agonist were considered. The importance of this variable was found to differ across the sample languages (Dutch, Ewe, Japanese, Lao, and Yucatec): at least one Lao construction was highly sensitive to this distinction (the construction could be used to express situations with causation dynamics, but not letting dynamics).

In the present study, we capture the contrast between force-dynamic causation and letting in the supplementary set of stimuli (in all of the core stimuli, all force-dynamic interactions in the chain are of the causation type). We consider two different types of inherent tendencies: gravity, and continued motion along a path. Ten of the 15 supplementary stimulus clips involve at least one letting type interaction. These letting interactions either consist of dropping an item (initially impinging on the item by preventing it from fulfilling its gravity-given tendency to fall to the floor, then ceasing to impinge, allowing the object to fall to the floor), or stepping away from a position where someone's path was blocked (initially impinging on the person by preventing them from fulfilling their inherent tendency of walking along their chosen path, then ceasing to impinge by stepping aside and allowing them through).

3.2.2 *The Video Representation of Causal Chain Types*

We captured different combinations of the variables of each dimension in video stimuli. All of the video clip stimuli were live action videos of interactions among humans, natural forces, and inanimate objects (or some subset of these) recorded by and starring members of the University at Buffalo Semantic Typology Lab, or taken from YouTube.[8] We chose to use live action video rather than animation or static representations (photos or line drawings), since the interpretation of animation and static images relies on conventions that may be subject to cross-cultural variation in ways that the interpretation of recorded video is not.

[8]The field manual and stimuli for all CAL studies is available online at *https://causalityacrosslanguages.wordpress.com/project-summary/field-manual-and-stimuli*.

Causation is a complex concept, with many different dimensions of variation, and it would not be practically feasible to consider every possible dimension and every possible combination of values from different dimensions, at least not in a study involving primary data collection from speakers of a wide range of languages. We constrained the design of the study by restricting the dimensions of variation we considered. A major motivating factor for choosing some dimensions over others is the ease to which differences in these dimensions could be represented in live action video with obvious cues and unambiguous representation of causation. We also aimed to produce scenes which are not culturally specific: we did not want to show any actions which would be seen as either offensive or very unusual or uninterpretable in some cultures. For example, spatio-temporal contiguity was investigated by Bohnemeyer et al. (2010) using animations, however it was apparent that some participants did not perceive the events in the stimuli as involving a causal relation.

Among the dimensions we did consider, there are many combinations of variable values which are not possible. For example, as discussed in Sect. 3.2.1.3, only humans can behave intentionally or unintentionally (while humans and inanimate objects can both be physically impacted). Below we describe several examples of causal chain types as they are represented in our stimuli. For a full list of the core and supplementary stimuli, see Appendices 1 and 2.

(2) a. `HO5_cuptower` (cf. Fig. 3.1 below):
A man slaps a tower of cups, which causes the tower to collapse.
Mediation: Unmediated
Participant type: *Causer*: Human; *Affectee*: Inanimate
Degree of participant autonomy: *Causer*: Intentional
Domain: Physical
Resulting event type: State change
Letting dynamics: No
Projectile breaking: No

b. `HUO2_cups` (cf. Fig. 3.2 below):
A woman sneaks up behind a man and yells loudly, startling him, and causing him to knock over a tower of cups.
Mediation: Mediated (Intermediator)
Participant type: *Causer*: Human; *Affectee*: Inanimate
Degree of participant autonomy: *Causer*: Intentional;
Affectee: Reflexive reaction to noise
Domain: *Intermediator*: Psychological;
Affectee: Physical
Resulting event type: State change
Letting dynamics: No
Projectile breaking: No

c. `UU2_sneeze`:
A woman sneezes loudly behind another woman, causing her to jump.
Mediation: Unmediated

Participant type: *Causer*: Human; *Affectee*: Human
Degree of participant autonomy: *Causer*: Unintentional; *Affectee*: Reflexive reaction to noise
Domain: Psychological
Resulting event type: Process
Letting dynamics: No
Projectile breaking: No

Having introduced this grid of variables, we now proceed to illustrate its application in the design of three separate cross-population studies of causal language and cognition. These studies primarily manipulate the variables 'mediation', 'participant type', 'participant autonomy', 'domain of causation', and 'resulting event type' to investigate their relationships with different aspects of the conceptualization and verbal representation of causality. These aspects are tightly interrelated. Consequently, while the specific domains of each study presented here differ, each provides data for or must be evaluated based on the results of others. The first study, presented in Sect. 3.3.1, examines patterns of linguistic descriptions of causal chains across causal chain types and linguistic populations. This data was used extensively as the basis for the production of verbal stimuli in our second study, presented in Sect. 3.3.2, which examined participant judgments of descriptions of causal chains. Our final study, described in Sect. 3.3.3, examines assignment of responsibility to members of a causal chain, and uses a non-verbal task to explore conceptualization of causality at a cultural level. Differences in responsibility assignment observed in this task will ultimately be compared to the production and speaker judgment data collected in Studies 1 and 2 to determine if a link may be present between causal cognition and a community's linguistic practices. Where possible, all three studies were conducted with each speaker population. As a result, some participants in each population participated in all three studies, but it is not the case for any population that complete participant overlap occurred for all three. In order to minimize the impact that participation in any given study may have had on the results of subsequent experiments, studies were sequenced such that if participants were involved in multiple tasks, they completed the non-verbal responsibility assignment task first (Case Study 3), followed by the discourse production task (Case Study 1), and concluding with the sentence ratings task (Case Study 2).

3.3 Applications: Three Case Studies

3.3.1 Case Study 1: Causality in Discourse

The first study that we present investigates the role of conversational implicatures in narrative descriptions of causal chains, and how usage patterns differ across different causal chain types, across speakers of the same language, and across different languages. We focus on the distribution of semantic underspecification of event

information: what types of event information do speakers (of particular languages) make explicit versus leave underspecified, and how is this affected by the type of causal chain they are describing.

Within a language, there are typically many different ways that a speaker could describe an event. Consider the descriptions in (3) (adapted from Bohnemeyer et al. (2010)): these could plausibly all describe the same event, although they differ with respect to the information they entail versus leave underspecified.

(3) a. Floyd opened the door.
b. Floyd pushed the door open.
c. Floyd pushed the door and it opened.
d. Floyd pushed the door and opened it.

The underspecification of three different types of event information is illustrated in (3): **subevent relation** (3c, 3d), **subevent kind** (3a, 3d), and **shared subevent identity** (3d). (3b) specifies the kind of subevent for both the causing and resulting subevents, the relationship between the two subevents, and does not describe the same subevent twice. We assume that the semantics of (3) are something like those in (4).

(4) a. $\exists e_1.\exists e_2.$ ACT(e_1,Floyd') $\wedge$ UGR(e_2,Door') $\wedge$ Open(e_2) $\wedge$ CAUSE(e_1,e_2)[9]
b. $\exists e_1.\exists e_2.$ ACT(e_1,Floyd') $\wedge$ UGR(e_1,Door') $\wedge$ Push(e_1) $\wedge$ UGR(e_2,Door') $\wedge$ Open(e_2) $\wedge$ CAUSE(e_1,e_2)
c. $\exists e_1.\exists e_2.$ ACT(e_1,Floyd') $\wedge$ UGR(e_1,Door') $\wedge$ Push(e_1) $\wedge$ UGR(e_2,Door') $\wedge$ Open(e_2)
d. $\exists e_1.\exists e_2.\exists e_3.$ ACT(e_1,Floyd') $\wedge$ Push(e_1) $\wedge$ ACT(e_2,Floyd') $\wedge$ UGR(e_3,Door') $\wedge$ Open(e_3) $\wedge$ CAUSE(e_2,e_3)

More detailed explanations of each type of underspecification are given below.

Subevent relation: In narrative description, speakers do not necessarily make all causal relations explicit, relying instead on stereotype implicatures[10] (Levinson 2000, p. 114) to convey a causal relation.[11] In descriptions like (3c), the relationship between the events described in the two clauses is *underspecified*. The most natural reading of (3c) is that pushing on the door caused it to open, although it is still possible to force a reading that the two events are not causally connected (as in (5)).

[9] *ACT* and *UGR* stand for 'actor' and 'undergoer', respectively.

[10] We assume that conversational implicatures are defeasible default interpretations, and unlike presuppositions are polarity dependent. Entailments, on the other hand, are non-defeasible but also polarity dependant.

[11] An alternative to the Gricean account relies instead on coherence relations to motivate the inference of a causal relation between two event descriptions (see Kehler and Cohen (2018) and references therein).

(5) Floyd pushed the door and it opened when Sophie stepped in front of the sensor.

A semantic representation for (3c) is shown in (4c): the causal relation between e_1 and e_2 (CAUSE(e_1,e_2)) is implicated. A pattern of causal underspecification in narrative descriptions of causal chains was observed by Bohnemeyer et al. (2010). Speakers of Dutch, Ewe, Japanese, Lao and Yucatec were asked to describe what happened in video clips depicting short causal chains (similar to those used in the present study), and would frequently describe the causal chains over multiple clauses without specifying causal relations.

Subevent kind: Semantic information about the nature of a subevent is left underspecified. While (3b) provides a semantic characterization of the type of event which caused the door to become open (pushing), (3a) does not: Floyd could have pushed the door, or pressed a button, or stood in front of a sensor. (3a) still entails that Floyd was the Actor in some causing subevent (and that this mystery causing subevent occurred), but the precise nature of the causing subevent is *underspecified*. A semantic representation of (3a) is shown in (4a): the nature of e_1 (Push'(e_1)) is implicated (assuming a stereotypical door that swings horizontally on hinges, as opposed to a sliding door or trapdoor.).

Causativized lexical items and the causative senses of polysmous causative-inchoative-alternating verbs (e.g., *The door opened* vs. *Sally opened the door*) typically encode a semantically underspecified subevent (*Sally opened the door* does not specify what Sally did to open the door – she might have twisted the doorknob and pushed the door open, or she might have dynamited the door; cf. the principle of 'morpholexical transparency' (Bohnemeyer 2007); 'manner/result complementarity' Levin and Rappaport-Hovav (1995)). The same holds for light verbs in periphrastic causative constructions (e.g., *Sally made Floyd reconsider his position* again does not specify what it was that Sally did that caused Floyd to reconsider: it might have been a suggestion, a threat, or Sally's own example). As with subevent relation underspecification, the underspecified information can typically be recovered via a stereotype implicature: we infer that, in the absence of a marked description, the nature of the causing event matches that which is a stereotypical cause of the resulting event it is paired with (or at least we assume it to be whatever we calculate as the most likely given the context).

Shared subevent identity: Sometimes a causal representation includes two subevent descriptions such that the intended interpretation of the representation requires the inference that these two actually refer to the same subevent. This shared identity may be an entailment or an implicature. In the latter case, we may say that the shared identity of the two subevents is underspecified. An example is (3d): the default reading is that the pushing caused the opening, and not that Floyd pushed the door, and then opened it by pressing a button. The description is still truth-conditionally compatible with the latter situation, and the description underspecifies whether the pushing event, and the underspecified causing event denoted by the transitive causative verb *open* are the same event

or not. A semantic representation of (3d) is shown in (4d): the shared identity of e_1 and e_2 is implicated ($e_1 = e_2$).

The next section lays out the methodology for exploring the distribution of these three kinds of underspecification in narrative descriptions of causal chains. Are there certain types of causal chains in which one or more causal relations are more likely to be left underspecified? Does the position in the causal chain affect the likelihood of underspecification? Do speakers within a language behave uniformly? Do speakers across languages behave uniformly?

3.3.1.1 Methodology

We collected descriptions of the CAL Clips from 10–20 speakers of English (Germanic), Japanese (Japonic), Korean (Isolate), Russian (Slavic), Sidaama (Cushitic) and Yucatec (Mayan).[12] Each participant would watch a clip, and was then asked to respond to the question 'What happened?'.[13] In order to clarify the level of informativity that they should provide, participants were instructed to respond as though they were describing what happened in the clips to a person who had not seen it. Specific examples of translations of 'what happened?' that were provided to participants included 'What would you say to your friend if she walked in soaking wet?' and 'How would you ask about the contents of a novel or a TV episode?'

The open-ended nature of the task meant that participants were free to use any strategy they liked for describing the clip. We designed an annotation system to allow us to compare descriptions across clips and speakers in terms of: (1) which of the events in the causal chain depicted in the clip were represented in the description; (2) whether those events were semantically specified or underspecified; and (3) whether the causal relation between each event in the causal chain was entailed by the description or merely implicated. In order to compare descriptions of the same clip across speakers, it was necessary to identify a maximal set of (relevant) subevents for the causal chain depicted in each clip. For example, in clip `HO5_cuptower`, in which a man slaps a tower built from paper cups, causing the tower to collapse, the possible subevents that a speaker might mention are given in (6):

(6) Event 1: *man hits tower of cups*
Event 2: *tower of cups collapses/falls*

[12]The CAL Clips comprise 43 core clips and 15 supplementary clips. Descriptions of solely the core clips were collected with Russian speakers. At the time of writing, data has also been collected (but not yet analyzed) from Basque, Datooga (Nilotic, Tanzania), Ewe (Gbe, Ghana and Togo), Mandarin, Nahuatl (Uto-Aztecan, Mexico), Spanish, Urdu (Indo-Aryan, Pakistan and India), and Zarma (Songhay, Niger). Analysis is ongoing.

[13]With the Japanese participants, an indirect question construction was used, since the direct form was considered too brusque.

(7) a. Mužčina sloma-l piramidk-u iz stakanov. 550
man(NOM.SG) break.down-PST tower-ACC.SG from cup:GEN.PL
'(The/a) man broke down the tower of cups.' [Russian, RUS5][14] 551

b. Someone hit a stack of cups and then the stack fell on the floor. [English, S5] 552 553

The descriptions in (7) were provided by speakers of English and Russian in response to clip `HO5_cuptower`. By identifying the maximal set of subevents (6), it is then possible to identify for each description which of these subevents are encoded, whether each subevent is underspecified, and whether the relationship between the two subevents is underspecified. (7a) exemplifies subevent kind underspecification: it includes a transitive causative verb *slomat'* 'crack', 'break down', which encodes both a causing and a resulting subevent with a causal relation entailed between them but leaves the causing subevent semantically underspecified (the description does not specify the man's action). (7b) exemplifies subevent relation underspecification: it also encodes two subevents, providing semantically specific information about each, but leaving the relationship between the two subevents underspecified (it does not entail that the hitting event caused the falling event). 554 555 556 557 558 559 560 561 562 563 564 565

Because we aim to compare the mapping between description and subevents not only for the same clip across speakers and language, but also for different clips, we required a way to relate the subevents in one clip to the subevents in other clips. This enables us to more precisely study the distribution of underspecification strategies across causal chains, and answer questions like: is the causal link between subevent X and subevent Y more likely to be underspecified for some causal chain types/languages? Or: where in the causal chain are speakers more likely to underspecify subevent kind? To achieve this, we included in the coding schema generalized subevent categories according to the position of events in the causal chain relative to each causal chain participant (causer/intermediator/affectee), and, for each clip's maximal set of subevents, determined which of these generalized subevent categories they fell under. The maximal set of generalized categories is shown in (8), and examples of the application of these labels to the maximum set of subevents in some sample scenarios is shown in (9). 566 567 568 569 570 571 572 573 574 575 576 577 578 579

(8) CAUSER ACT, INTERMEDIATOR RESULT, INTERMEDIATOR ACT, AFFECTEE RESULT, AFFECTEE ACT 580 581

(9) a. `HO5_cuptower`: 582
CAUSER ACT: *man hits tower of cups* 583
AFFECTEE RESULT: *tower of cups collapses* 584

[14] Key to morpheme glosses: 3 – 3rd person; A – Cross-reference 'Set A' (ergative/possessor); ACC – Accusative; B – Cross-reference 'Set B' (absolutive/stative); CMP – Completive status (perfective aspect and declarative/realis mood); D2 – Anaphoric/distal particle; DEF – Definiteness; F – Feminine; GEN – Genitive; INC – Incompletive status (imperfective aspect and neutral/unmarked mood); NOM – Nominative; PL – Plural; PRV – Perfective aspect; PST – Past tense; SG – Singular.

b. `HMO4_cups`:
CAUSER ACT: *woman pushes man*
INTERMEDIATOR RESULT: *man falls into tower of cups*
AFFECTEE RESULT: *tower of cups collapses*

c. `UC1_sing`:
CAUSER ACT: *woman 1 sings loudly/badly*
AFFECTEE RESULT: *woman 2 is annoyed*
AFFECTEE ACT: *woman 2 leaves room*

Each description was annotated in terms of which of the subevents were encoded in the description (and how many times each subevent was encoded), whether each subevent encoding was semantically specified or not, and whether the causal relation between each subevent encoding was entailed or not.

3.3.1.2 Results and Discussion

This annotation scheme produces a large quantity of data reflecting the distribution of different kinds of underspecification in the narrative descriptions. A large number of different questions could potentially be asked of this data, and analysis is still ongoing.

We found all three types of underspecification (subevent relation, subevent kind, and shared subevent identity) across all six languages. Yucatec and Sidaama speakers in particular produced at least one type of underspecification in almost every description. Subevent relation underspecification was most frequent in Sidaama and Korean. Subevent kind underspecification was most frequent in Yucatec and Japanese. Subevent identity underspecification was most frequent in Japanese and Yucatec. English and Russian had the two highest percentages of descriptions which did not contain any of the three kinds of underspecification.

Languages vary in the lexical and morphosyntactic resources they have available for the representation of causal chains. This variation may be partially responsible for the differences we found in underspecification strategies. For example, we might expect a higher rate of subevent kind underspecification in languages with a richer inventory of transitive causative verbs, causative morphology, or periphrastic causatives (all of which encode complex events and typically include an underspecified causing event) and we might expect less subevent relation underspecification in languages with productive resultative or serial verb constructions (or complex predicate types which semantically specify multiple subevents).

Aside from the properties of the languages involved, another working hypothesis that may partially account for variation in underspecification rates is that speech communities with high literacy rates among speakers and a strong written tradition are more likely to prefer more explicit linguistic forms with less underspecification particularly of causal relations. Written registers are typically more explicit than spoken registers: they are not subject to the same working memory limitations, and can thus use more words to express the same concept. At the same time, since most

writing happens outside the situation context that is being written about, the need for explicitness is greater. If a high proportion of speakers are frequently using written language, then a preference for greater explicitness may transfer from written to spoken registers. The sample of languages in our study is currently too small for any serious empirical test of this hypothesis, but it is a potential line of inquiry for future work.

Another hypothetical cultural factor driving underspecification is politeness. It has been suggested that attribution of responsibility may be habitually more circumspect in cultures in which responsibility implies a high potential for face loss (e.g., Keenan (1989); cf. also Brown and Levinson (1987)). This nexus too remains to be explored.

Lexical and morphosyntactic factors, literacy, and the community's politeness ethos would all potentially affect causal attributions independently from one another, and their effects would thus counteract one another (and potentially cancel one another out).

3.3.2 *Case Study 2: The Semantic Typology of Causality*

The second case study to be presented here aims at a 'semantic typology' of causal language. Semantic typology is the crosslinguistic study of semantic categorization. It compares languages in terms of the lexical and morphosyntactic resources their speakers use for communications that involve concepts of a given domain – in this case, the domain of causality. Included in the scope of investigation are the morphosyntactic, semantic, and pragmatic properties of these devices and the speech community's pertinent practices of language use. Cf. Evans (2010), Koptjevskaja-Tamm (2015), and Moore et al. (2015) for general introductions to semantic typology.

With the exception of a small pilot study presented in Bohnemeyer et al. (2010), which was a direct precursor of the present study, the research discussed in this subsection is the first of its kind – the first semantic typology of causality ever undertaken to our knowledge. The most basic property that sets this research apart from previous typological studies on causative coding devices is its perspective (cf. Comrie (1981), Dixon (2000), Escamilla (2012), Kemmer and Verhagen (1994), Shibatani (1976), Shibatani and Pardeshi (2002), and Song (1996); *inter alia*). These previous studies do not look systematically at how different kinds of causal chains are expressed across languages, but rather single out a few constructions per language that the researchers identify as causative on largely implicit criteria and then compare their meanings and use to one another. In contrast, our study proceeds by observing systematically how speakers of different languages communicate about a range of related concepts. Regarding the problem of ensuring an 'etically' valid definition of the notion of 'causality' without imposing it on the 'emic' semantic analysis of language-specific constructions, we refer the reader to the discussion in the beginning of Sect. 3.2 above. As stated there, we assume an

etic definition of 'causality' consistent with a 'causal pluralism' approach. This assumption is built into the design of the video stimuli described in Sect. 3.2.2 by restricting them to scenes that instantiate all the properties that have been suggested by previous research as being potentially involved in the cluster concept of 'causality'.

Due to its inherent perspective of mapping concepts to expressions, production data plays a privileged role in most approaches to semantic typology. The study presented here goes beyond this by combining production- and comprehension-based designs. The production phase involves the collection of descriptions of the CAL Clips introduced in Sect. 3.2. During the comprehension phase, these serve as the basis for verbal stimuli whose goodness of fit with respect to the CAL Clips is assessed via acceptability ratings. In preparation for the comprehension phase, the participating researchers, who are experts on their field languages, extract the major causative coding devices from the production data. An inventory of response types is compiled, and for each clip, a set of descriptions is created that instantiate all major response types in the inventory. Descriptions of each scene instantiating the full range of major response types are created with the help of first-language speakers. These stimulus descriptions are then rated for their acceptability by a minimum of 12 speakers per language. The advantages of this multiphasic design are the following:

- It provides insights into the use of causative coding devices in both production and comprehension.
- It produces both positive and negative evidence – that is evidence regarding both preferred and dispreferred uses.
- With an implementation such as the one we chose, it permits a distinction between descriptions considered to be false and descriptions considered to be truth-conditionally adequate but pragmatically infelicitous.
- It permits data collection from a potentially large number of speakers per language while keeping transcription demands manageable.

The specific research question that has motivated the study presented here concerns the role of iconicity in causative descriptions across languages. It has long been argued that across languages, morphosyntactically simpler causative devices are preferred for conceptually and semantically simpler, more **direct** causal chains, while morphosyntactically more complex descriptions are preferred for more complex, **indirect** chains. Haiman (1983) calls this the **Iconicity Principle** (cf. also Comrie (1981), Dixon (2000), Kemmer and Verhagen (1994), Rappaport-Hovav and Levin (2010), McCawley (1976, 1978), Shibatani (1976), Shibatani and Pardeshi (2002), Talmy (2000), and Verhagen and Kemmer (1997), *inter alia*). For a simple illustration, consider the following examples from Yucatec Maya:

(10) Le=máak=o' t-u=nik-ah le=bàaso-s-o'b=o'.
DEF=person=D2 PRV-A3=scatter-CMP(B3SG) DEF=cup-PL-PL=D2
'The man, he scattered the cups'

(11) a. #Le=x-ch'úupal=o' t-u=nik-ah
DEF=female:child=D2 PRV-A3=scatter-CMP(B3SG)
le=bàaso-s-o'b=o'.
DEF=cup-PL-PL=D2
'The girl, she scattered the cups'

b. Le=x-ch'úupal=o' t-u=mèet-ah
DEF=F-female:child=D2 PRV-A3=make-CMP(B3SG)
u=nik-ik le=bàaso-o'b le=máak=o'.
A3=scatter-INC(B3SG) DEF=cup-PL DEF=person=D2
'The girl, she made the man scatter the cups'

Example (10) was produced as a description of CAL Clip `HO5_cuptower`. It shows a man collapsing a cup tower by slapping it with his hand (cf. Fig. 3.1). The description features a base-transitive causative verb. The same coding device is rejected in (11a) as pragmatically misleading in response to `HUO2_cups`, in which a woman or girl is shown sneaking up behind a man who is building a cup tower. She purposely startles him and he collapses the cup tower (cf. Fig. 3.2). In this case, a simple transitive causative verb would be appropriate with the actor role assigned to the male character, but not to the female one. When the female is to be construed as the causer, the periphrastic causative construction in (11b) is preferred.

While this contrast seems straightforward enough, a recent statistical examination of published data from a typologically and areally broadly varied sample of 50 languages by Escamilla (2012) failed to find a significant correlation between directness of causation and morphosyntactic complexity. Escamilla classified causative coding devices in the languages of his sample based on the information provided

Fig. 3.1 `HO5_cuptower`

Fig. 3.2 HUO2_cuptower

in published resources. He notes that he often relied on examples provided by his sources (op. cit. 82), raising the question to what extent his investigation was influenced by translations.

Escamilla applied the set of semantic and lexical predictor variables proposed by Dixon (2000). Dixon does not define 'directness'. The examples he gives include what we call 'mediation' (causal chains mediated by a intermediator are less direct than unmediated causer-on-affectee chains), but also distinctions of force dynamics (letting something happen is less direct than causing it) and domain of causation (physical impact is more direct than psychological impact). This comes close to the abstract view of directness espoused in Bohnemeyer et al. (2010) and the present study, which treats directness not as one semantic predictor variable among others, but rather as a superordinate or "meta-"variable that summarizes the effects of all individual semantic predictors on morphosyntactic complexity. In contrast, despite using 'directness' in a more abstract sense, Dixon treats it as one predictor of morphosyntactic complexity among others, such as intentionality and control. This exacerbates the absence of a definition: apparently, directness is understood as a more specific notion than simply the aggregate of all semantic properties that predict morphosyntactic complexity, yet no set of criteria is laid down by which it could be decided what counts as direct and what does not. Escamilla adopts Dixon's classification, making it difficult to know how he coded the constructions he found in the descriptions of the sample languages he worked with.

Escamilla's results are difficult to interpret. He did not find a significant correlation between 'compactness' (i.e., morphosyntactic complexity) and any of Dixon's semantic predictors. As he readily acknowledges, this is easily explained by the lack of valid data that would have allowed him to score a given construction

for a given predictor. Nevertheless, Escamilla singles out the absence of a correlation between compactness and directness as particularly noteworthy:

> In other words, this data set failed to produce empirical support for the Iconicity Principle: low compactness is claimed, crosslinguistically, to correlate with less direct causative action (as in the now-famous *I killed him* vs. *I let him die* (...)). This claim has been found to hold for other sets of languages, and I do not suggest that it is not a valid generalization; however, I also have no good explanation for the fact of the near random patterning we see here. (Escamilla 2012: 89)

The study presented in this subsection permits a validation of Escamilla's findings against a sample of so far just four unrelated languages from three continents: Datooga (Nilotic, Tanzania; data collected and coded by A. Mitchell), Japanese (Japonic, Japan; data collected and coded by K. Kawachi); Sidaama (Cushitic, Ethiopia; data collected and coded by K. Kawachi), and Yucatec (Mayan, Mexico and Belize; data collected and coded by J. Bohnemeyer). The investigation is ongoing; the four data sets analyzed here represent just a snapshot. In contrast to Escamilla's approach, our research is based on the actual observation of the behavior of at least 12 speakers per language vis-à-vis a large set of verbal and nonverbal stimuli following a rigid protocol.

3.3.2.1 Methods

Stimuli

In a first step, descriptions of the CAL Clips were either specifically collected for this study from a few speakers of each language or, where available, were taken from the data collected for the subproject on the verbalization of causal chains in narratives discussed in Sect. 3.3.1. The researchers, who are experts on the grammars and lexicons of the target languages, then created inventories of major response types, where a response type was understood as comprising a single causative coding device or a combination of causative coding devices. Example (11b) illustrates such a combination: a base-transitive causative verb embedded in the complement of a periphrastic causative construction. Our working definition of 'causative coding devices' included any lexical expressions or morphosyntactic constructions that encode two or more events and in suitable contexts entail both the realization of the events and a causal relation holding between them in the 'etic' sense of 'causality' discussed in the beginning of Sect. 3.2. Where researchers were in doubt as to whether a certain construction really could be considered causative, they verified with the help of native speaker consultants using entailment tests.

Once an inventory of response types had been established, a set of descriptions of each CAL Clip was created with the help of first-language speaker consultants. For each clip, this set of descriptions instantiated every response type. Where no suitable lexical material was available – e.g., no transitive causative verb that expresses the relevant kind of action, or no transitivized verb featuring causative morphology – a form was made up by the researcher, expecting of course its rejection during the acceptability rating phase.

A number of control sentences were added to the descriptions of a random subset of the clips. These control sentences fell into three categories: (i) blatantly ungrammatical; (ii) morphosyntactically wellformed but glaringly false of the scene at issue; (iii) presenting information about the scene that was accurate, but irrelevant to the task of communicating what is happening in the scene. The motivation behind the inclusion of these control items was, first, to encourage the participants to make use of the entire rating scale, and secondly, to have a baseline for the interpretation of each participant's ratings.

Training

Participants unfamiliar with the idea of rating scales were tutored on the concept by discussing examples that it was hoped would serve to bridge it, such as grading in school. All participants were then trained on the use of the 8-point rating scale with the help of two training videos, one in which a woman is shown placing a pencil on a table and one in which she is shown placing it in a cup on the table. Using nontechnical language, the participants were instructed to distinguish among ungrammatical descriptions (lowest ratings), incorrect descriptions (second-lowest rating interval), correct but misleading or unhelpful descriptions (second-highest rating interval), and descriptions that would be specifically useful for the purpose of explaining the contents of the videos to somebody who has not seen them, but for some reason needs to know what is 'happening' in the scenes. An example of a correct but misleading description of the training scene with the woman putting the pencil in the cup is 'The woman put the pencil on the table': this is not entirely false, since the cup is on the table, but it is misleading. The procedure was continued until the participants produced the expected ratings on more than two consecutive descriptions. The training was conducted in the target languages.

Test Phase

Participants were assigned to four lists. Each list was shown the CAL Clips in a different, pseudo-randomized order. The clips were shown in a PowerPoint presentation. The order of presentation of the descriptions of each clip was randomized with the help of an Excel spreadsheet. The same spreadsheet was used to record the participants' ratings. Participants watched each video at least once (and additional times if they asked to). The researcher then read each description out aloud and asked the participant to rate it before moving on to the next description. Participants were encouraged to take as much time as they liked and urged to rate each description by itself rather than in comparison to the other descriptions of the same video. They were reminded at regular intervals that they could assign any rating as often as they saw fit to descriptions of the same scene. They were given the opportunity to produce additional descriptions, including improved versions of existing ones. The researchers would repeatedly encourage the participants to make

use of the entire scale and remind them of the distinction among ungrammatical, incorrect, infelicitous, and felicitous descriptions. It would take participants between under 30 and close to 90 min to complete the task. All participants completed the task in a single sitting. The task was entirely conducted in the target languages.

Coding

The stimulus descriptions' response types were coded by the participating researchers for their morphosyntactic complexity level. The most morphosyntactically compact descriptions involve only a single predicate, which encodes both causing and resulting events. To categorize the morphosyntactic complexity of descriptions which encode the causing and resulting events in separate predicates, the **Layered Structure of the Clause (LSC)** model of Role and Reference Grammar (Van Valin 2005) was used. In this model, morphosyntactic complexity is assessed in terms of two independent dimensions: the complexity level of the constituents that combine to constitute a given expression and the morphosyntactic relation between the constituents. These dimensions are called **juncture** and **nexus**, respectively. The model assumes four juncture levels or 'layers': nucleus, core, clause, and sentence (where the nucleus is an argument-taking head and constitutes the core together with its syntactic arguments). The nucleus of an event description is the lexical event descriptor; the core dominates the nucleus and its syntactic arguments, and the clause dominates one or more core(s) plus additional material, in particular operators related to finiteness and information perspective. Combinations of these structural units, called 'junctures', occur at each of these structural levels. Nuclear junctures are exemplified (non-exhaustively) by complex predicates, core junctures by non-finite complementation constructions, and clause-layer junctures by adverbial clause constructions. Junctures can be symmetrical or asymmetrical. Asymmetrical junctures involve embedding of one unit (typically a core or clause) in another. This embedding relation is called 'subordinate nexus' in this model. The LSC model includes three nexus relations: coordination (defined in terms of symmetry and independence in operators and modifiers), subordination (defined in terms of asymmetry), and cosubordination (defined in terms of symmetry and sharing of operators and modifiers). Coordination is assumed to be the loosest and cosubordination the tightest form of integration of the constituents. Due to the sharing of operators and modifiers, the constituents enjoy less autonomy in cosubordination than in subordination, where such sharing is absent. Crossing the three juncture types with the three nexus types results in nine logically possible juncture-nexus types, although two of these, nuclear subordination and nuclear coordination, are only marginally attested typologically. Juncture and nexus are treated as projecting into a single hierarchy, with simplex nuclei representing the tightest possible integration of subevent representations, followed by nuclear cosubordination, and sentential coordination representing the loosest form of integration. This single complexity hierarchy is one of the two properties that

motivated the adoption of the LSC model for present purposes, the other being its broad (arguably universal) applicability regardless of language type.

3.3.2.2 Results

The participants' ratings have been analyzed in terms of the factors that predict the morphosyntactic compactness or **juncture-nexus type (JNT)** of the descriptions that scored the highest rating for a given clip (the 'ceiling rating'). Three predictive variables have been considered: language, mediation (mediated vs. unmediated), and domain (specifically, whether or not the causer makes physical contact with the next participant in the chain). The heatmaps in Fig. 3.3 summarizes the results for each of the four languages.

As expected, and in line with the Iconicity Principle, more compact descriptions ('Simplex nucleus' and 'Nuclear cosubord.', representing base-transitive causative verbs and complex predicates) were rated as acceptable for unmediated causal chains than for mediated causal chains. Within each mediation level, physical causation chains also were considered more compatible with compact descriptions

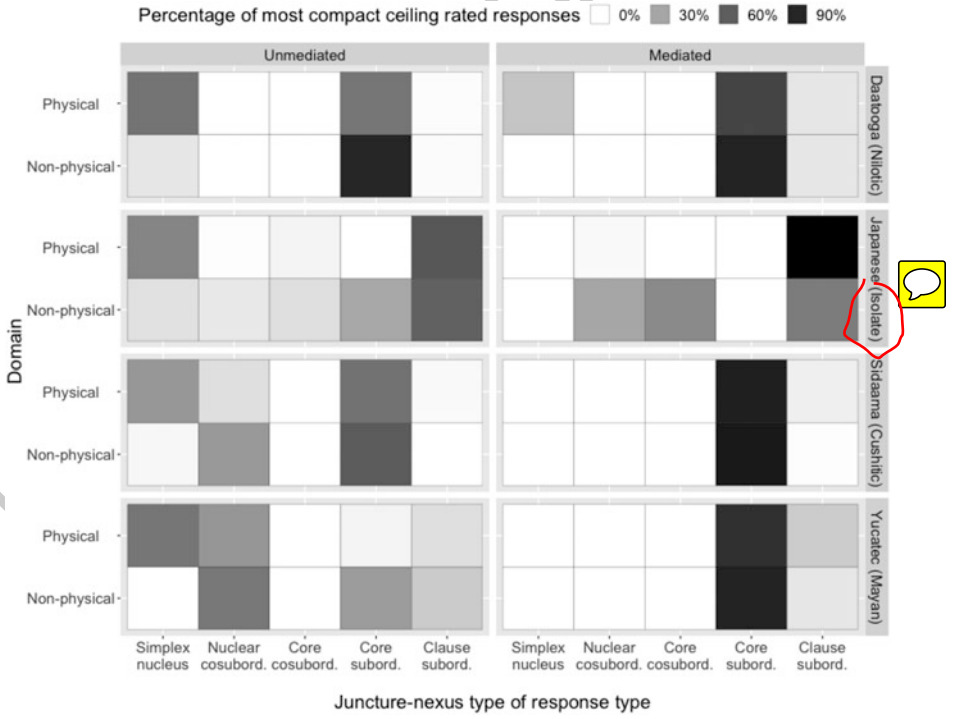

Fig. 3.3 Percentage of each juncture-nexus type for the most compact ceiling-rated description for each clip + participant by language, domain and mediation

than non-physical ones. However, surprisingly, an ordinal mixed-effects logistic regression model with most compact ceiling-rated JNT as dependent variable, domain, language, and mediation as fixed factors; and clip, order, and participant as random factors produced evidence of solely domain and language main effects, whereas mediation mattered only in interactions with those factors (cf. Bellingham et al. (2017) for details). However, see comments in Sect. 3.3.2.3 regarding limitations of this type of analysis that result from imbalances in the current stimulus set.

3.3.2.3 Discussion

To understand the interplay between domain and mediation in our data, it is important to know that the two correlate strongly in the design of the CAL Clips: most scenes that feature three-participant (i.e., mediated) chains involve psychological or speech act causation, and conversely, most scenes that involve psychological or speech act causation also display mediation by a intermediator. We believe that this correlation is not merely an artifact, but actually reflects biases in the kinds of causal chains humans think and talk about most commonly. This assumption remains to be tested against corpus data.

The observation that domain may be a stronger predictor of the morphosyntactic complexity of causative descriptions than mediation does provide a potential clue for the explanation of the failure of Escamilla (2012) to find a significant correlation between directness and morphosyntactic complexity: both mediation and domain appear to be tied up in the understanding of the directness variable in Dixon (2000), and it is unclear how Escamilla's coding policies dealt with these two factors.

At the same time, this very preliminary analysis of data from just four languages did turn up evidence supporting the Iconicity Principle, provided one assumes psychological and speech act causation is conceptually more complex (or less direct) than physical causation. Data from additional populations is currently being integrated into the analysis.

3.3.3 Case Study 3: Reasoning About Causality

The research described in this section was motivated by the need to see to what extent cultural specificity in causal cognition is represented in or possibly influenced by language. While we are not yet able to relate cognitive variation to linguistic variation, the experiments discussed here serve as a launching point to this investigation, and additional research into this question is currently underway. Much of the work in linguistics that focuses on the mapping of form to meaning implicitly treats causality and agency as universal notions – even in crosslinguistic research (e.g., Comrie (1981), Dixon (2000), and Shibatani and Pardeshi (2002)). Meanwhile, a growing body of work in the field of social psychology calls the

universality of these notions very much into question (cf. references below). If these concepts are subject to cultural variation, it is important to understand whether this variation also affects concepts such as agentivity that typology and theories of the syntax-semantics interface rely on. As a test case, we chose to examine whether the contrast between intentional and unintentional actions has a different impact on responsibility attribution in different populations.

A series of studies in social psychology have suggested cultural variation in attention to dispositional properties, with Chinese participants exhibiting less attention to actor disposition – including intentions – compared to Americans (e.g., Morris and Peng (1994), Chiu et al. (2000), Choi and Nisbett (1998), Choi et al. (1999), Maddux and Yuki (2006), Menon et al. (1999), and Peng and Knowles (2003), *inter alia*). Although we based our experiment design on this literature, we also recruited participants from populations whose position on the sociocentrism-egocentrism spectrum is less clear, since we are ultimately not primarily interested in the hypothetical nexus between patterns of social organization and attention to dispositions, but more broadly in any kind of culture-specificity in causal attributions. We plan to follow up with all participants with a survey presented in Singelis (1994) that targets the participants' 'self-construal', specifically, the extent to which it involves social interdependence vs. independence from others. The rest of this section discusses the methodology employed in the responsibility assignment task and presents some initial data showing the trends we found in causal attribution.

3.3.3.1 Method

Participants watched videos of two actors involved in a chain of events that culminates in a resulting event. In each case, the chain is initiated by one actor, dubbed the 'causer' (CR) in the following. The second actor is affected by the CR's action and may or may not in turn affect a third, inanimate, entity. This second actor is labeled CE. After watching each video, participants divided 10 tokens into piles indicating their assignment of responsibility for the resulting event. Piles represented CR, CE, and 'Neither'.

Materials

The experiment comprised a training phase involving 10 video clips and a test phase with 24 video clips. The test items are described in Table 3.1 in terms of the action/event involving the second actor (CE). These actions/events can all in one way or another be understood as caused by the CR – in some cases via a physical impact on CE; in others via a reflexive/uncontrolled or deliberate psychological response to the CR's behavior or as a response to a gestural command by CR. Three intentionality variables are represented as well: whether CR intended their action (I $\Rightarrow$ A), whether CR intended the outcomes of the chain (I $\Rightarrow$ O), and

Table 3.1 Test phase video description

CE action	CR I ⇒ A	CR I ⇒ O	CE intentional	
CE breaks a plate	Yes	Yes	Yes	t3.2
CE breaks eggs	Yes	Yes	Yes	t3.3
CE collapses a cup tower	Yes	No	No	t3.4
CE collapses a cup tower	Yes	Yes	No	t3.5
CE collapses a cup tower	Yes	Yes	No	t3.6
CE falls	Yes	Yes	No	t3.7
CE falls	No	No	No	t3.8
CE falls	Yes	Yes	No	t3.9
CE is scared/falls over	Yes	Yes	No	t3.10
CE is startled	No	No	No	t3.11
CE is thrown a distance	Yes	Yes	No	t3.12
CE laughs	Yes	Yes	No	t3.13
CE leaves	Yes	No	Yes	t3.14
CE leaves	Yes	Yes	Yes	t3.15
CE sits down	Yes	Yes	Yes	t3.16
CE swings a swing	Yes	Yes	Yes	t3.17
CE tears a piece of paper	Yes	Yes	Yes	t3.18
CE tears a piece of paper	Yes	Yes	No	t3.19
CE tears a piece of paper	No	No	No	t3.20
CE tears a piece of paper	Yes	Yes	No	t3.21
CE tosses a ball into a box	Yes	Yes	Yes	t3.22
CE wakes	Yes	No	No	t3.23
CE yawns	No	No	No	t3.24

whether CE acted intentionally/volitionally.[15] We adopted these variables from the 'Culpable Control Model' presented in Alicke (2000) on account of the model's positive reception in the social psychology literature.

Four of the training items featured scenes that fit the same parameters as the test items. The remaining six items featured actions on which the two actors collaborate, events that seemingly occurred without the involvement of either actor, and events in which one actor destroyed an object while the other looked on.

[15]Items that are represented in terms of the same description and configuration of variables in Table 3.1 differed from one another in terms of (1) the use of an instrument by the CE, (2) for unintentional CEs, the medium of interaction between the CR and the CE (physical (e.g., pushing) vs non-physical (e.g., yelling loudly to startle) manipulation). The impact of these further variables has not yet been analyzed.

Participants

For the initial study, 12 speakers of Yucatec Maya, 16 Mandarin speakers, and 20 Spanish speakers were recruited from and tested at sites in Barcelona and Murcia, Spain, at Beihang University in Beijing, China, and in the village of Yaxley, Quintana Roo, Mexico. In the follow-up study, we recruited 25 Basque speakers, 20 Japanese speakers in Tokyo, 12 Kupsapiny speakers from Kapchora in the Sebei sub-region of Eastern Uganda, and 22 Sidaama speakers from Hawassa and Wondo Genet in the Sidaama Zone of Ethiopia.

Training

The purpose of the training phase was to allow the participants to gradually familiarize themselves with the ratings procedure and the concept of rating scales. For this reason, we began with scenes in which the assignment of responsibility seemed straightforward (be it that evidently neither actor was responsible or only one of them or both to equal parts) and included four items similar in structure to the test items at the end, where responsibility assignment seems less predictable as responsibility may be shared asymmetrically between the characters. The training phase commenced with the six clips that featured collaborative action, no involvement of either actor, or one actor involved while the other was not. The experimenter would play the first three of these, each time following up by apportioning the tokens in the appropriate way and explaining why they did so. After this, the experimenter would invite the participant to use the tokens to rate responsibility in the remaining seven scenes. The experimenter would play a clip, establish which circle on the paper represented each actor in the video, then replay the video and eventually ask the participant to distribute the tokens. The experimenter would correct any confusion about allocating the tokens and verify that the participant understood the task.

Procedure

Participants were given 10 identical tokens (small glass stones or other objects of similar size). To prevent confusion about the purpose of the task, no tokens resembling currency were used. These tokens represented total responsibility for end results in video clips observed during the task, such that each token represented 10% of total responsibility. Participants were also given a sheet of paper with three circles drawn on it. The leftmost circle represented the character who ended in the left-most position or final frame of the video clip, the center circle represented the other character, and the right-most circle represented a portion of the responsibility that could not be attributed to either character. Circles were arranged in a horizontal row, or in two rows where the two circles representing actors were next to one another in the top row and the 'neither' circle was drawn below them. The test

items were presented in one of four pseudo-randomized orders. Participants were randomly and evenly distributed over these four orders.

During the test phase, participants watched the 24 test clips. After each clip, the experimenter indicated which circle would represent each actor in the video and then played the video a second time. The participant was then asked to distribute responsibility for the final outcome of the clip between the actors. Responses were recorded in a spreadsheet. After watching the 24 clips, the participant viewed each clip again and provided a verbal description of the action in the video.

3.3.3.2 Results

Predictions

Suppose that members of sociocentric societies are relatively less likely to pay attention to internal dispositions of the causer and more to situational factors in their causal attributions, and suppose further that the mainstream cultural ethos of China is relatively more sociecentric than that of many Western societies, with the latter emphasizing individualism more strongly, as suggested by Morris and Peng (1994). If this is the case, the intentionality of both actors should play a less predictive role in the ratings of the Chinese participants than in those of the Spanish participants. On the other hand, the findings in Le Guen et al. (2015) suggest that causer intentionality may play an even greater role in the Yucatecans' responsibility assignments than in those of either of the other two groups.[16] No predictions were made for other populations due to lack of reported data on sociocentric and egocentric values.

Analysis

An analysis of a subset of the data (Mandarin-, Spanish- and Yucatec-speaking populations) suggests that I $\Rightarrow$ A (causer intention to initiate an event) was a significant factor in responsibility assignment while I $\Rightarrow$ O (causer intention for a particular outcome to occur) was not (see Evers et al. (2017) for details). Figure 3.4 shows the mean CR responsibility ratings by population, suggesting

[16]Le Guen et al. (2015) stand on a tradition of research into the role of so-called magical thinking in causal attribution in traditional societies dating back to Evans-Pritchard (1937), and have interpreted this tradition to entail that members of such cultures are more ready to accept intention alone as the cause of an event even in the absence of observable actions. In a series of experiments, they tested Yucatec attribution of causality where an actor intended an outcome they had no way of affecting and found that intention to act impacted attribution of responsibility. One could interpret the findings to say that Yucatecans weight intentionality to a greater degree than other cultures in responsibility attribution.

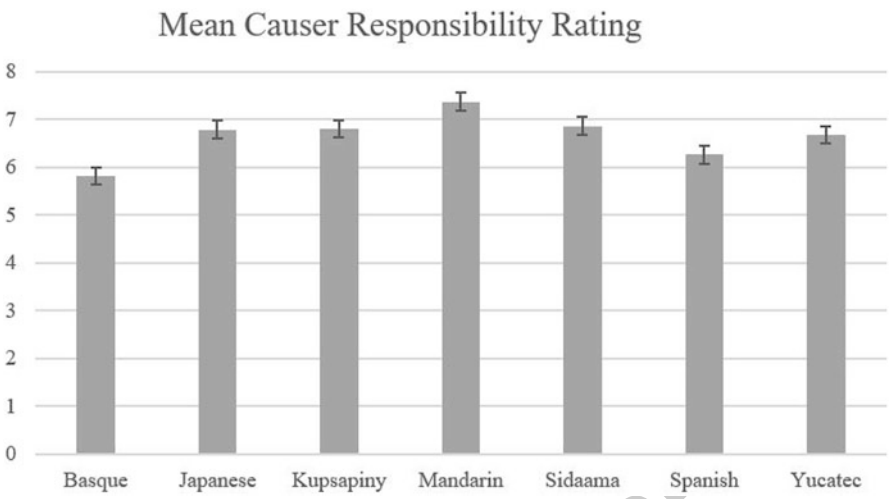

Fig. 3.4 Average responsibility ratings for all (intentional and unintentional) causers by population. Error bars represent 95% confidence interval

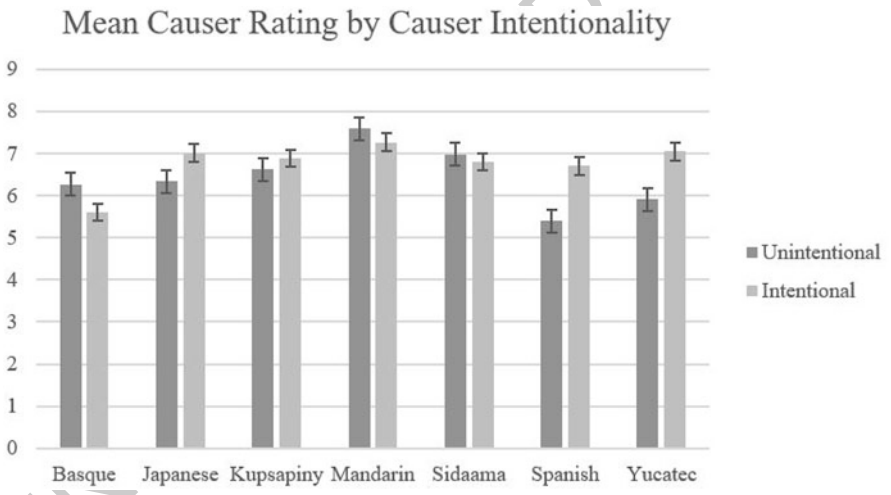

Fig. 3.5 Average responsibility ratings for causers by intentionality and population. Error bars represent 95% confidence interval

small but significant differences in Spanish, Basque, and Mandarin responsibility rankings. Figure 3.5 presents a breakdown by CR intentionality, suggesting all populations but Basque and Mandarin speakers assigned more responsibility to intentional than to unintentional CRs, as predicted. Figure 3.6 shows mean CR responsibility ratings by population, comparing ratings when CEs are intentional

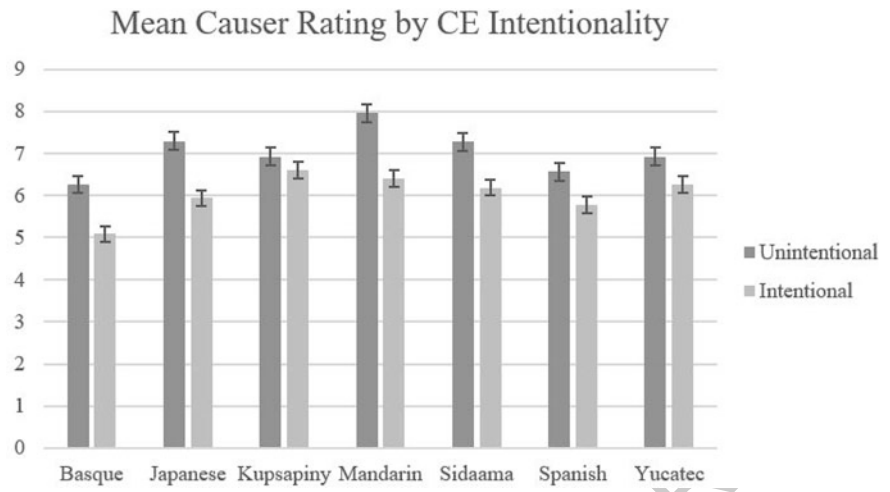

Fig. 3.6 Average responsibility ratings for CRs by CE intentionality and population. Error bars represent 95% confidence interval

and unintentional. The results of this analysis show significant differences between CR responsibility ratings depending on CE intentionality, where for all populations except for Kupsapiny speakers, CRs are awarded significantly higher levels of responsibility in the presence of an unintentional rather than intentional CE.

3.3.3.3 Discussion

In this study, we investigated the extent to which the contrast between intentional and unintentional actions impacts responsibility attribution in different populations. The presence of an unintentional (nonvolitional) second actor (as opposed to a second actor who acted intentionally) significantly boosted attribution of responsibility to the causer across populations. Overall CR responsibility ratings for all populations were significantly lower than those of the Chinese participants except for Sidaama speakers, although the differences for all were quite small. Japanese, Kupsapiny, Sidaama, and Yucatec speakers were all fairly uniform in overall responsibility attribution, while Spanish and Basque populations were significantly lower than other groups. Ratings for unintentional and intentional CRs were significantly different for Spanish, Yucatec, and Japanese populations only, suggesting that sensitivity to intention when assigning responsibility may vary by culture. Because differences in social organization between populations such as speakers of Spanish and Basque are unclear, we are interested in evaluating other possible social factors in the variation of responsibility attribution, including language. Given that the representation of causality also has a significant impact on

the grammar and lexicon of natural languages, it is possible that differences in causal cognition affect responsibility ratings awarded to causers, and that language may actually be involved in shaping the transmission system of culture-specific cognitive practices.

This study investigates the participant autonomy variable in the etic grid and how it impacts responsibility assessment in a mediated causal chain. For this study, we did not evaluate differences in mediation (CEs acting with or without an instrument). We also did not distinguish between full and partial CE control for psychological causation, but instead treated CE behavior as a binary between intentionally participating in the causal chain (volitionally or under psychological coercion), and unintentional participation in the causal chain through physical impact.

3.4 Discussion

The three studies presented here apply the same etic grid of variables and variable levels in three distinct research designs that target data gathering on speech production (Sects. 3.3.1 and 3.3.2), speech comprehension (via acceptability judgments; Sect. 3.3.2), and nonverbal cognition (Sect. 3.3.3). All three studies are ongoing: data from additional populations is being collected, coded, and incorporated into the analyses. Yet, all three studies have already produced interpretable results that suggest tentative answers to the research questions they were designed to answer. The study on causality in narratives found that the same underspecification strategies are used across the languages included in the analysis so far, but that there are differences in the extent to which the populations rely on the individual strategies. The study on the semantic typology of causative coding devices has uncovered preliminary evidence that domain, in the sense of the distinction between physical and nonphysical causation, may be a more powerful predictor of morphosyntactic complexity than mediation, in the sense of the number of participants and subevents involved in the chain. The investigation of responsibility assignment by members of different cultural communities has uncovered findings that so far align with predictions arising from the social psychology paradigm that posits a nexus between broad-scale patterns of social organization and the importance of internal dispositions in judgments of responsibility. However, the investigation has also found significant behavioral differences between populations that appear to be broadly similar in social organization (Mayan vs. Sebei (Kupsapiny-speaking)), suggesting that factors beyond social organization may be at play or perhaps that the sociocentrism-egocentrism variable is not sufficient to capture the relevant differences in social organization. In addition, it remains to be seen to what

extent culture-specific patterns of responsibility assignment correlate with language-specific patterns in the verbalization of causal relations.[17,18]

This is of course not to say that the grid and the CAL Clips are optimal tools for this type of research, or even for the studies we have been carrying out. It is in fact difficult to assess how close these tools come to being optimal. But at least, we can point out some shortcomings that have emerged.

One important deficiency of the CAL Clips is that they do not instantiate all cells of the etic grid with the same frequency. Consequently, a data set collected with the clips will comprise many more observations in some cells than in others. When the number of observations is below a certain threshold, statistical analyses such as the mixed-effects regression model mentioned in Sect. 3.3.2 may yield spurious, unreliable results. We are currently planning to overcome this problem by creating additional stimulus videos. We are also considering a redesign of the studies that would allow us to target smaller sets of variables in separate experimental conditions. This may make it possible to focus the analysis such that each combination of variables is instantiated in enough clips.

There were also problems with particular videos. Several cases of ambiguity in causal relations emerged. In the clip `UM1_asleep`, a woman is shown apparently asleep in a chair, and a man walks across the room and apparently accidentally trips over her foot, waking her up. We had intended the man to be the causer and the resulting event to be the woman's waking up, but across study populations, it was perceived by some participants in this intended manner and by others with the woman as the causer and the man's tripping as the resulting event. In the scene `HM1_fall`, a woman is shown sweeping, when another walks up in front of her and stops there, apparently looking for something while unaware that she is impeding the first woman's action. The first woman then pushes the second, and she falls to the floor. The clip was supposed to represent physical causation of motion with a human causer and affectee. However, some participants viewed the woman who winds up being pushed as the initiator of the causal chain and the caused motion event as being itself the result of a caused psychological change (aggravation) in the pusher.

Another kind of ambiguity problem influenced the identification of the characters acting in the videos in some cases. There were several scenes where participants

[17] That it was possible to reach these findings on the basis of the set of variables and levels we started out with and the video clips we created to represent the possible combinations of these variables and levels can be considered a proof of concept for the etic grid and stimulus set. An additional study further strengthening the case for these tools is Hafeez (2018), which applied them to the investigation of intricate agentivity-sensitive patterns of case alternations and light verb selection in Urdu, following broadly the methodology of our semantic typology study (while deviating from it in some details). Hafeez's work in particular contributed to our understanding of the interaction of these variables in the design of the CAL etic grid.

[18] We think that intentionality and control are crucial for the verbal representation of causality in all languages. Illustration of the importance of volitionality, intentionality, and control in the grammar of causality comes from Indo-Aryan languages, some of which have been shown to have case alternations and complex predicate constructions that are sensitive to these variables.

were misled in the attribution of gender due to clothing items and possibly unfamiliarity with gender-specific facial traits in members of other ethnic groups (exacerbated of course by the limitations of the videos in size and quality). Our advice for future studies of this kind would be to make sure that actors appearing in the same scene dress in distinct and easily identifiable colors.

A potential problem of particular interest for our purposes is culture-specific folk theories of what kinds of events can cause what other kinds of events. It is important to note that we did not observe this problem occurring with any level of generality, with one exception: in the video `UU1_yawn`, a woman yawns, and a man yawns in response. The idea of infectious yawning proved to be unfamiliar to many of our non-Western participants.

Overall, the studies presented here suggest that crosslinguistic and cross-cultural investigations of representations of causality that rely on an etic grid of potential predictor variables and a set of nonverbal stimuli encoding the combinations of the levels of these variables are feasible, and that their realization is not too daunting within the context of a collaborative project with the relatively modest support the CAL project has received. We believe, then, that this collection of studies can serve as a model, not only for the exploration of other subdomains within causality (e.g., biological and social causation), but also for the exploration of other domains beyond causality.

3.5 Conclusions

We presented a set of variables and levels for the cross-population exploration of verbal and cognitive representations of causality. We encoded the possible variable/level combinations in a set of 58 video clips and applied these in three studies to the collection of verbal production and comprehension data and of cognitive categorization data. These studies' preliminary findings can be summarized as follows:

- In connected speech, speakers across languages appear to rely on the same basic strategies for underspecifying information about subevent properties, subevent identity, and causal relations.
- However, there was variation in the extent to which speakers of different languages rely on each type of strategy. We hypothesize that such differences may be driven both by the grammar and lexicon of the languages and by cultural and demographic factors such as literacy.
- The preferred level of morphosyntactic complexity of a causative description does indeed appear to iconically reflect the conceptual complexity of causal chain that is represented.
- However, the distinction between physical and non-physical causation seems to be a stronger predictor of morphosyntactic complexity than mediation, in the sense of the number of potentially controlling participants involved in the chain.

The models discussed here do include some collinearity between mediation and domain of causation, meaning that future research will be necessary in order to assess the full significance of causal domain.

- There appear to be significant differences across populations in the extent to which perceived causer intentionality drives responsibility assignments.
- These differences seem to at least partially align with suggested differences in how members of different cultural communities conceptualize social organization.
- However, it is not clear that all observed cross-population differences in responsibility assignment can be attributed to differences in social cognition.

All three studies are ongoing at the time of writing and all results should be considered preliminary. It is our hope to have contributed an instrument that we are both happy to share with other researchers in cognitive anthropology, linguistics, and social psychology and that may inspire other cross-population studies in the domain of causality and beyond.

Appendix 1: Causal Chain Properties of Core Stimuli

Each video clip in the **core** set of stimuli is listed below, along with a short description of the causal chain depicted in the clip and the values intended for each causal chain variable. See Sect. 3.2 for a description of the causal chain variables.
Causal chain participants:
CR = causer, CE = intermediator, AF = affectee, INS = instrument

`HO6_paper` A woman tears a piece of paper in half.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HC1_leave` A woman tells a man to leave the room, and he leaves.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: HUMAN+INTENTIONAL
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HOIproc1_swing` A man pushes a swing with a tennis racquet and it moves back and forth.
Mediation: INS but no CE. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

`HUO3_paper` A woman sneaks up behind another woman and yells loudly, which startles the other woman and makes her tear the piece of paper she is holding.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: HUMAN+REFLEXIVE (NOISE); AFFECTEE:

INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HO2_egg` A woman cracks an egg into a bowl.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`NM2_reporter` A reporter is blown away in strong wind.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: NATURAL FORCE; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HOI4_ball` A man hits a ball off a wooden bench with a tennis racquet.
Mediation: INS but no CE. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HO5_cuptower` A man knocks over a cup tower
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UO1_egg` A woman trips while carrying eggs, and accidentally smashes them into a bowl.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UM3_faint` A man faints onto another man and knocks him over.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HMO4_cups` A woman pushes another man into a stack of cups, and he knocks it over.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: HUMAN+PHYSICAL IMPACT; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HU2_scare` A girl jumps out of a box and shrieks, startling a boy, and he falls over.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: HUMAN+REFLEXIVE (NOISE)
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UO2_paper` A woman is flipping through a book and accidentally tears a page.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HCO3_egg_new` A man tells a woman to crack an egg into a bowl, so she does.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`NC1_tsunami` A man sees a giant wave heading towards him on a beach, so he runs away.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: NATURAL FORCE; AF: HUMAN+INTENTIONAL
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HOI3_plate` A woman shatters a plate with a broom handle.
Mediation: INS but no CE. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UC1_sing` A woman is singing poorly, so another woman covers her ears and leaves the room.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; AF: HUMAN+INTENTIONAL
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HCOI2_paper` A woman tells another woman to cut up a piece of paper with scissors, so she does.
Mediation: CE and INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HO4_ball` A man throws a ball into a box.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HM1_fall` A woman pushes another woman to the floor.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`UMO2_cups` A woman enters a room backwards, dragging a table. She bumps into a man standing in front of a stack of cups, and he bumps the cups and they fall to the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; CE: PHYSICAL IMPACT; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`NM4_umbrella` An umbrella blows away in the wind.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: NATURAL FORCE; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HOI1_paper` A woman cuts a piece of paper into pieces with scissors.
Mediation: INS but no CE. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HUO2_cups` A woman sneaks up behind a man and yells loudly, which startles the other man and makes him bump the stack of cups he is standing next to, then the cups all fall to the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**:

CR: HUMAN+INTENTIONAL; CE: REFLEXIVE (NOISE); AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UM1_asleep` A woman is sleeping in a chair, and a man walks across the room and accidentally trips over her foot, waking her up.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`NU1_thunder` A loud thunder clap startles a woman.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: NATURAL FORCE; AF: HUMAN+REFLEXIVE (NOISE)
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HMO3_paper` A woman pushes a woman who is holding a piece of paper, and the paper tears.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: PHYSICAL IMPACT; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HOproc1_swing` A man pushes a swing and it moves back and forth.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

`HCO2_paper` A woman tells a woman to tear a piece of paper into pieces, and so she does.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UM2_overboard` A reporter standing on a boat steps backwards and bumps into another man who is kneeling at the edge of the boat, knocking him (the kneeling man) into the water.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`UOproc1_swing` A man accidentally bumps into a swing, causing it to move back and forth.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

`HC2_sit` A man tells a woman to sit, and so she does.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: HUMAN+INTENTIONAL
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HCOproc1_swing` A woman tells a man to push a swing, and so he does.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

`UOI1_cuptower` A man is sweeping next to his stack of cups, he turns and accidentally knocks the cups over with the broom handle.
Mediation: INS but no CE. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UU2_sneeze` A woman sneezes behind another woman, startling her/making her jump.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: HUMAN+REFLEXIVE (NOISE)
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

`HU1_laugh_new` A man pulls a funny face and makes a woman laugh.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: HUMAN+REFLEXIVE (URGE)
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

`NCO1_umbrella` It is raining, and so a man opens an umbrella.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: NATURAL FORCE; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HCOI3_plate` A man tells a woman to shatter a plate with a broom handle, and so she does.
Mediation: CE and INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`UO3_ball` A woman accidentally kicks a ball over her head and out of the room.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`UUO2_paper` A woman sneezes behind a man who is reading the newspaper. He is startled, and tears the newspaper.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; CE: REFLEXIVE (NOISE); AF: INANIMATE
Resulting event type: CHANGE OF STATE. **Force dynamics**: CAUSATION

`HCO4_ball` A woman tells a man to throw a ball into a box, and so he does.
Mediation: CE but no INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; CE: INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`HM2_strongman` A man picks up another man and throws him across the room.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+INTENTIONAL; AF: HUMAN+PHYSICAL IMPACT
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: CAUSATION

`UU1_yawn` A woman yawns, another man sees her yawning and so he yawns.
Mediation: No CE or INS. **Participant type + degree of autonomy**:
CR: HUMAN+UNINTENTIONAL; AF: HUMAN+REFLEXIVE (URGE)
Resulting event type: PROCESS. **Force dynamics**: CAUSATION

Appendix 2: Causal Chain Properties of Supplementary Stimuli

`HClet_door` A man blocking a woman from exiting a room sees her and moves to let her pass.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: INTENTIONAL
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: LETTING

`HO1_cup` A woman throws a cup at the floor and it smashes.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: CAUSATION

`UUO1_egg` A man accidentally slams the door, which startles another man in the room who is holding an egg, which makes him drop the egg and it smashes.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; CE: HUMAN+REFLEXIVE (NOISE); AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: LETTING

`HO_let_ball` A woman releases the ball she is holding, allowing it to fall.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: LETTING

`HCO1_cup` A man tells another man to throw a cup at the floor, so he does, and the cup smashes.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; CE: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: CAUSATION

`HUO1_plate` A woman sneaks up behind a man and yells loudly, which startles the man and makes him drop the plate he is holding. It smashes on the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; CE: HUMAN+REFLEXIVE (NOISE); AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: LETTING

`UC_let1_doorway` A woman tries to exit the room, but a man is blocking the doorway (facing away from her). He doesn't see her, but moves away from the door and she passes through.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; AF: INTENTIONAL
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: LETTING

~~`HMOlet_ball`~~ A woman pulls the arm of another woman who is holding a ball, making her drop the ball.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; CE: HUMAN+PHYSICAL IMPACT; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: LETTING

UMO1_cup A woman enters a room holding a large bin which is blocking her vision. She bumps into a man who is holding a cup, he drops the cup and it smashes on the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; CE: HUMAN+PHYSICAL IMPACT; AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: CAUSATION

UO4_cup A man is sitting at a desk, he moves his arm as he turns a page and bumps a cup off the desk, and it smashes on the floor.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: CAUSATION

HMO1_plate A woman pushes another woman who drops the plate she was holding. It smashes on the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+INTENTIONAL; CE: HUMAN+PHYSICAL IMPACT; AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: CAUSATION

UCO1_ball A man faints near a woman who is holding a ball, she lets the ball go to catch him and the ball falls to the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; CE: HUMAN+INTENTIONAL; AF: INANIMATE
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: LETTING

NUO1_thunderclap A man is standing holding a plate, there is a loud thunderclap which startles him and he drops the plate, which smashes on the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: NATURAL FORCE; CE: HUMAN+REFLEXIVE (NOISE); AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: LETTING

UUO3_cup A man gestures for a woman sitting at a desk to hand him a jacket hanging behind her. She reaches for the jacket, and knocks a cup off the table. The cup smashes on the floor.
Mediation: CE but no INS. **Participant type + degree of autonomy**: CR: HUMAN+UNINTENTIONAL; CE: HUMAN+UNINTENTIONAL; AF: INANIMATE
Resulting event type: PROJECTILE BREAKING. **Force dynamics**: CAUSATION

MClet_doorway A man blocking a woman from exiting a room does not move, so she pushes him aside and exits.
Mediation: No CE or INS. **Participant type + degree of autonomy**: CR: HUMAN+PHYSICAL IMPACT; AF: HUMAN+INTENTIONAL
Resulting event type: CHANGE OF LOCATION. **Force dynamics**: LETTING

Acknowledgements The material presented here is based upon work supported by the National Science Foundation under Grant No. BCS153846 and BCS-1644657, 'Causality Across Languages'; PI J. Bohnemeyer. In addition, Kawachi's research was supported by the Japan Society for the Promotion of Science under grant KAKENHI Project ID 19K00565. We are grateful

to three anonymous reviewers and the editors of the volume, Nora Boneh and Elitzur Bar-Asher Siegal, for their constructive criticism. We would like to thank the members of the University at Buffalo Semantics Typology Lab for assistance with the creation of the stimuli (Katherine Donelson, Alexandra Lawson, Randi Moore, and Karl Sarvestani) and piloting of the Responsibility Assignment study design (José Antonio Jódar Sánchez) and the members of the Beihang Research Group for Event Representation and Cognition for their assistance in testing the Chinese participants (specifically, Enirile, Hongxia Jia, Fuyin Li, Jinmei Li, Sai Ma, Chenxi Niu, and Mengmin Xu). We also gratefully acknowledge helpful advice from Dare Baldwin, the late Sieghard Beller, Andrea Bender, and Bertram Malle, none of whom necessarily agree with the views expressed in our chapter. The responsibility for any mistatements or omissions is naturally ours alone.

References

Alicke, M. D. (2000). Culpable control and the psychology of blame. *Psychological Bulletin, 126*(4), 556–574.

Anscombe, G. E. M. (1971). Causality and determination. Reprinted in E. Sosa & M. Tooley (Eds.), *Causation* (pp. 88–104). Oxford: Oxford University Press, 1993.

Bellingham, E., Evers, S., Kawachi, K., Mitchell, A., & Bohnemeyer, J. (2017). An experimental approach to the semantic typology of causative constructions. Poster, *12th Association for Linguistics Typology Conference (ALT 2017)*.

Bohnemeyer, J. (2007). Morpholexical transparency and the argument structure of verbs of cutting and breaking. *Cognitive Linguistics, 18*(2), 153–177.

Bohnemeyer, J., Enfield, N. J., Essegbey, J., & Kita, S. (2010). The macro-event property: The segmentation of causal chains. In J. Bohnemeyer & E. Pederson (Eds.), *Event representation in language: Encoding events at the language-cognition interface* (pp. 43–67). Cambridge: Cambridge University Press.

Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language use.* Cambridge: Cambridge University Press.

Chiu, C.-Y., Hong, Y.-Y., Morris, M. W., & Menon, T. (2000). Motivated cultural cognition: The impact of implicit cultural theories on dispositional attribution varies as a function of need for closure. *Journal of Personality and Social Psychology, 78*(2), 247–259.

Choi, I., & Nisbett, R. E. (1998). Situational salience and cultural differences in the correspondence bias and in the actor-observer bias. *Personality and Social Psychology Bulletin, 24*, 949–960.

Choi, I., Nisbett, R. E., & Norenzayan, A. (1999). Causal attribution across cultures: Variation and universality. *Psychology Bulletin, 125*(1), 47–63.

Comrie, B. (1981). *Language universals and linguistic typology: Syntax and morphology*. Chicago: University of Chicago Press.

Croft, W. (1998). Event structure in argument linking. In M. Butt & W. Geuder (Eds.), *The projection of arguments* (pp. 1–43). Stanford: Center for the Study of Language and Information.

Davidson, D. (1969). The individuation of events. In N. Rescher (Ed.), *Essays in honor of Carl G. Hempel* (pp. 295–309). Dordrecht: D. Reidel.

Dixon, R. M. W. (2000). A typology of causatives: Form, syntax and meaning. In R. M. W. Dixon & A. Y. Aikhenvald (Eds.), *Changing valency: Case studies in transitivity* (pp. 30–83). Cambridge: Cambridge University Press.

Escamilla, R. M. Jr. (2012). *An updated typology of causative constructions: Form-function mappings in Hupa (Californian Athabaskan), Chungli Ao (Tibeto-Burman) and Beyond*. Ph.D. Dissertation, University of California, Berkeley.

Evans, N. (2010). Semantic typology. In J. J. Song (Ed.), *The Oxford handbook of linguistic typology* (pp. 504–533). Oxford: Oxford University Press.

Evans-Pritchard, E. E. (1937). *Witchcraft, oracles and magic among the Azande*. Oxford: Oxford University Press.

Evers, S., Bellingham, E., Donelson, K., Du, J., Jódar Sánchez, J. A., Li, F., & Bohnemeyer, J. (2017). The role of intentionality in causal attribution is culturally mediated: Evidence from Chinese, Mayan, and Spanish populations. In *Proceedings of the 39th Annual Meeting of the Cognitive Science Society* (pp. 343–348).

Grimshaw, J. (1990). *Argument structure*. Cambridge, MA: MIT Press.

Hafeez, S. (2018). *Causality and agentivity in Urdu: Sensitivity of case clitics and light verbs to volitionality, intentionality and control in Urdu*. Qualifying Paper, University at Buffalo.

Haiman, J. (1983). Iconic and economic motivation. *Language, 59*(4), 781–819.

Harris, M. (2001). *Cultural materialism: The struggle for a science of culture.* Walnut Creek: AltaMira Press.

Heider, F., & Simmel, M. (1944). An experimental study of apparent behavior. *American Journal of Psychology, 57*, 243–259.

Keenan, E. (1989). Norm-makers, norm-breakers: Uses of speech by men and women in a Malagasy community. In R. Bauman & J. Sherzer *Explorations in the ethnography of speaking.* (2nd ed., pp. 125–143). Cambridge: Cambridge University Press.

Kehler, A., & Cohen, J. (2018). On convention and coherence. In G. Preyer (Ed.), *Beyond semantics and pragmatics* (pp. 261–283). Oxford: Oxford University Press.

Kemmer, S., & Verhagen, A. (1994). The grammar of causatives and the conceptual structure of events. *Cognitive Linguistics, 5*(2), 115–156.

Koptjevskaja-Tamm, M. (2015). Semantic typology. In E. Dabrowska & D. Divjak (Eds.), *Handbook of cognitive linguistics* (pp. 453–472). Berlin: Mouton de Gruyter.

Le Guen, O., Samland, J., Friedrich, T., Hanus, D., & Brown, P. (2015). Making sense of (exceptional) causal relations. A cross-cultural and cross-linguistic study. *Frontiers in Psychology, 6*, 1–16.

Levin, B., & Rappaport-Hovav, M. (1995). *Unaccusativity: At the syntax-semantics interface*. Cambridge, MA: MIT press.

Levinson, S. (2000). *Presumptive meanings*. Cambridge, MA: MIT Press.

Maddux, W. W., & Yuki, M. (2006). The "ripple effect": Cultural differences in perceptions of the consequences of events. *Personality and Social Psychology Bulletin, 32*, 669–683.

McCawley, J. (1976). Remarks on what can cause what. In M. Shibatani (Ed.), *Syntax and semantics VI: The grammar of causative constructions* (pp. 117–129). New York: Academic.

McCawley, J. (1978). Conversational implicature and the lexicon. In P. Cole (Ed.), *Syntax and semantics IX: Pragmatics* (pp. 245–258). New York: Academic.

Menon, T., Morris, M. W., Chiu, C.-Y., & Hong, Y.-Y. (1999). Culture and the construal of agency: Attribution to individual versus group dispositions. *Journal of Personality and Social Psychology, 76*(5), 701–717.

Moore, R. E., Donelson, K. T., Eggleston, A., & Bohnemeyer, J. (2015). Semantic typology: New approaches to crosslinguistic variation in language and cognition. *Linguistics Vanguard, 1*(1), 189–200.

Morris, M. W., & Peng, K. (1994). Culture and cause: American and Chinese attributions for social and physical events. *Journal of Personality and Social Psychology, 67*(6), 949–971.

Mourelatos, A. P. (1978). Events, processes, and states. *Linguistics and Philosophy, 2*, 415–434.

Parsons, T. (1990). *Events in the semantics of English: A study in subatomic semantics*. Cambridge, MA: MIT Press.

Peng, K., & Knowles, E. D. (2003). Culture, education, and the attribution of physical causality. *Personality and Social Psychology Bulletin, 29*, 1272–1284.

Pike, K. L. (1967). *Language in relation to a unified theory of the structure of human behavior*. The Hague: Mouton.

Rappaport Hovav, M., & Levin, B. (2010). Reflections on manner/result complementarity. In M. Rappaport Hovav, E. Doron, & I. Sichel (Eds.), *Syntax, lexical semantics, and event structure* (pp. 21–38). Oxford: Oxford University Press.

Shibatani, M. (Ed.). (1976). *The grammar of causative constructions* (Syntax and semantics, Vol. 6). New York: Academic.

Shibatani, M., & Pardeshi, P. (2002). The causative continuum. In M. Shibatani (Ed.), *The grammar of causation and interpersonal manipulation* (pp. 85–126). Amsterdam: Benjamins.

Singelis, T. M. (1994). The measurement of independent and interdependent self-construals. *Personality and Social Psychology Bulletin, 20*(5), 580–591.

Smith, C. S. (1979). The syntax and interpretation of temporal expressions in English. *Linguistics and Philosophy, 2*(1), 43–99.

Song, J. J. (1996). *Causatives and causation: A universal-typological perspective*. London: Longman.

Talmy, L. (1988). Force dynamics in language and cognition. *Cognitive Science, 12*(1), 49–100.

Talmy, L. (2000). *Toward a cognitive semantics*. Cambridge, MA: MIT Press.

Van Valin, R. D. Jr. (2005). *Exploring the syntax-semantics interface*. Cambridge: Cambridge University Press.

Vendler, Z. (1957). Verbs and times. *The Philosophical Review, LXVI*, 143–160.

Verhagen, A., & Kemmer, S. (1997). Interaction and causation: Causative constructions in modern standard Dutch. *Journal of Pragmatics, 27*, 61–82.

von Wright, G. H. (1963). *Norm and action*. London: Routledge/Kegan Paul.

Wolff, P. (2003). Direct causation in the linguistic coding and individuation of causal events. *Cognition, 88*(1), 1–48.

Wolff, P., Jeon, G.-H., & Li, Y. (2009). Causers in English, Korean, and Chinese and the individuation of events. *Language and Cognition, 1*(2), 67–196.

AUTHOR QUERY

AQ1. Please check if updated author affiliation details are okay.