CAUSAL REFERENCE AND INVERSE SCOPE AS MIXED QUOTATION

CHUNG-CHIEH SHAN

Department of Computer Science and Center for Cognitive Science
Rutgers, The State University of New Jersey
ccshan@rutgers.edu

Causal reference falls out from an account of mixed quotes that can be nested and applied to constructions: a speaker's use of a term is a mixed quote of the occasion on which the speaker acquired the term. Mixed quotes thus pervade shared language, despite the lack of quotation marks. This theory generates inverse scope under left-to-right evaluation, because an earlier quantifier can be quoted and outscoped. It also predicts the failure of polarity licensing in *'Alice introduced anybody to nobody'.

Mixed quotes are quotes that appear to mix mention and use, or direct and indirect quotation, such as (1).

(1) Quine says that quotation 'has a certain anomalous feature.' (Davidson 1979)

I argue that mixed quotation is a general phenomenon that pervades language. In fact, most of our speech consists of mixed quotes of ourselves and each other. Of course, because the vast majority of utterances do not call for quotation marks in print, this point is only plausible if we broaden the notion of mixed quotation to include many of them. My first order of business is thus to explain a broader notion of mixed quotation. I then use this notion to analyze naming and quantification.

1. The essence of mixed quotation

Informally speaking, I take a mixed quote to mean what someone uses the quoted expression to mean (Geurts and Maier 2003). For example, (1) means that Quine says that quotation has the property that Quine uses 'has a certain anomalous feature' to mean. The quoted expression need not be grammatical, as (2) shows.

(2) The president said he has an 'ecelectic' reading list. (Maier 2007)

1.1. Nested mixed quotes

Mixed quotation can be nested (iterated), just as pure quotation can be.

(3) The politician said she is 'sorry to have used an 'epithet' '.

On one reading, (3) means that the politician said she has the property that she uses the phrase ‘sorry to have used an ‘epithet’ ’ to mean. Assuming that the politician is a normal English speaker, this property is to be sorry to have used an element of the set that someone unspecified uses the word ‘epithet’ to mean. The outer quotation level in (3) distinguishes the speaker’s sense of ‘sorry’ from the politician’s; the inner level distinguishes the politician’s sense of ‘epithet’ from others’.

1.2. Mixed quotes of constructions

A construction can be quoted, just as an ordinary expression can be.

(4) The politician admitted she ‘lied [her] way into [her job]’.

(5) It is a long story how I lied my way into this despicable position of deception.

Thanks to the square brackets in (4) or their spoken counterpart, the sentence is true if the politician said (5) as a normal English speaker. More precisely, the sentence is true just in case the politician admitted she the property gyz, where g is the ternary relation that she used the construction ‘lied … way into …’ to mean, y is her, and z is her job. Intuitively, what is quoted in (4) is not an expression but a construction that combines the subexpressions ‘my way’ and ‘this despicable position of deception’, along with their meanings, to form a verb phrase, along with its meaning.

An ordinary expression is a special case of a construction, namely a nullary one—a construction that takes no input. The binary construction quoted above is a canonical non-nullary construction, but less canonical ones can be mixed-quoted as well.

(6) John doesn’t know much French, but he thinks he does and tries to show it off whenever possible. At dinner the other day, he ordered not ‘[some dessert] à la mode’ but ‘à la mode [some dessert]’.

On one reading, (6) is true if John ordered using the words ‘à la mode apple pie’ but not ‘apple pie à la mode’. That is, the second mixed quote in (6) is of a unary construction. The construction’s form maps expressions to expressions: it puts ‘à la mode’ before a dessert name. The construction’s meaning maps desserts to desserts.

1.3. Distinguishing syntactic and semantic interjection

Conventional punctuation using square brackets confuses two ways to interrupt a quote and interject words used from the quoter’s perspective. The first way, exemplified above, is for the meaning of the interjected words to combine *semantically* with the (rest of the) quote: in (4), the meaning of ‘her’ and ‘her job’, say the politician and her job, may serve as arguments to some functional meaning of the construction ‘lied … way into …’. The second way, exemplified below, is for the meaning of the interjected words to combine *syntactically* with the (rest of the) quote.

(7) The secret guide suggested that interested eaters ‘kiss up to [name redacted], class of 2008, for a good meal’ at the Ivy.

The secret guide did not suggest that interested eaters kiss up to a redacted name.

To avoid this ambiguity of square brackets, we notate semantic interjection %[like this] and syntactic interjection ~[like this]. We further distinguish mixed quotes from pure and direct quotes by notating mixed quotes ![like this] and pure and direct quotes ⌈like this⌉. For example, we notate (7) as follows.

(8) The secret guide suggested that interested eaters ![kiss up to ~[name redacted], class of 2008, for a good meal] at the Ivy.

1.4. A sketch of a formalization

I analyze a mixed quote as a construction whose form is Qf and whose meaning is: $\iota g.\ x$ uses the construction f to mean g. Here f and Qf are two functions on forms, related in some way Q yet to be specified. The meaning of the quote is anaphoric to some discourse referent x and presupposes that the speaker x uses f to mean a function g on meanings. These anaphoric and presuppositional dependencies are part of the quote's meaning and remain to be resolved, so the meaning of a mixed quote is *not* g, even provided that some speaker x uses a construction to mean g.

There are multiple Q's, corresponding to different strategies of resolving these dependencies. To take a simple example from written English, suppose that f is a function that maps n strings to a string. Sticking to single quotation marks, we can then define another function Qf that maps n strings to a string, by

$$Qf x_1 \dots x_n = \overline{`}\,\widehat{}\,(f(\overline{[}\,\widehat{}\,x_1\,\widehat{}\,\overline{]}) \dots (\overline{[}\,\widehat{}\,x_n\,\widehat{}\,\overline{]}))\,\widehat{}\,\overline{`} \tag{9}$$

where overlines cover literal strings and the operator $\widehat{}$ denotes string concatenation. Given this Q, we can analyze the written form of (3) and (4) as follows.

$$(\lambda x.\, \overline{\text{The p. said she is}}\ \widehat{}\ x)\ (Q((\lambda x.\, \overline{\text{sorry to have used an}}\ \widehat{}\ x)(Q\,\overline{\text{epithet}}))) \tag{10}$$

$$(\lambda x.\, \overline{\text{The p. admitted she}}\ \widehat{}\ x)\ (Q(\lambda x_1 x_2.\, \overline{\text{lied}}\ \widehat{}\ x_1\ \widehat{}\ \overline{\text{way into}}\ \widehat{}\ x_2)\,\overline{\text{her}}\,\overline{\text{her job}}) \tag{11}$$

The forms generated match (3) and (4) above, whereas the meanings generated match the paraphrases given under (3) and (4). These examples show how to analyze nested mixed quotes and mixed quotes of constructions.

I claim that the grammar of human language is largely generated by mixed quotes.

1.5. Mixed quotes of formal languages

For intuition, it may help to draw a parallel between this treatment of mixed quotation and the practice of code switching between natural and formal languages, such as embedding formulas in English sentences. Our analysis of mixed quotation amounts to paraphrasing the mixed quote in (12) in terms of the pure quote in (13).

(12) Alice said $\Gamma(2)$ is negative.

(13) Alice said what mathematicians use $\Gamma(2)$ to mean is negative.

Formulas can be quoted in a formal language as well as a natural language, for instance using *Gödel numbering*. Given a Gödel numbering, the truth and provability of a formula in a logic can then be defined as arithmetic predicates. These predicates are the formal analogues of our account of the meaning of mixed quotation.

2. The prevalence of mixed quotation

In a mixed quote as in a pure quote, the quoted speaker may be generic, hypothetical, or institutional, and the quoted use may be generic, hypothetical, or habitual (Geurts and Maier 2003). Mixed quotation is thus a versatile source of constructions: in principle, a mixed quote can draw its meaning from any construction use by any speaker, be it real or imagined, in the past, present, or future. Thus, mixed quotation can serve many purposes in the use and transmission of language.

2.1. Naming and other causes

A mild instance of prevalent mixed quotation is names according to a causal theory of reference (Kripke 1980). When Alice uses 'Aristotle' to mean Aristotle, unless she is baptizing Aristotle by coining the name, she relies on a previous use of the name to mean Aristotle. In other words, the nullary construction that pairs the name with the person is a mixed quote. This mixed quote is slightly unusual in two regards, but neither invalidates this analysis of names as mixed quotes.

First, the quoted form (say $Q\,\overline{\text{Aristotle}}$) and unquoted form (say $\overline{\text{Aristotle}}$) sound and look exactly the same, so one may be concerned as to how the hearer of Alice's utterance can know to parse 'Aristotle' as a quote. But there are few ways for 'Aristotle' to appear in a sentence, among which this parse is likely the top candidate.

Second, Alice and her interlocutors may not recall a specific occasion on which a specific speaker used the name to mean Aristotle, so it may be indeterminate who the quoted speaker is. But like any other discourse referent, x can have its dependencies resolved as long as it is known that there exists a speaker (even an institutional one such as the English language) and a use (even a generic one such as usually). Such mixed quotes are common: the inner quote in (3) could be one, for example.

The use of 'Aristotle' that Alice mixed-quotes is either specifically the initial baptism of Aristotle or another mixed-quote of a use of 'Aristotle', and so on. The chain of naming occasions formed by mixed quotation $!\lceil!\lceil!\lceil\ldots$ Aristotle $\ldots\rceil\rceil\rceil$ is like a causal chain of naming, except the latter does not usually contain a generic event.

Why stop at names? This 'copy-and-paste' syntax and semantics works across the board, so the sentence 'Aristotle saw his sister' can be cobbled together solely by composing mixed quotes as in (14). Ordinary language, then, is full of mixed quotes.

(14) $!\lceil\%[!\lceil$Aristotle$\rceil]$ saw $\%[!\lceil\%[!\lceil$him$\rceil]$'s sister$\rceil]\rceil$

The analysis (14) assumes that the mixed-quoted expression 'him' is used to mean an anaphoric dependency. Similarly, in order for us to analyze Alice's use of

'I' to mean herself as a mixed quote of Bob's use of 'I' to mean himself, we must assume that the mixed-quoted use of 'I' means a context dependency on the first person, even though Bob also use the same form to mean himself.

2.2. Quantification and polarity

A quantifier can be thought of as a meta-construction: 'everybody' maps a unary construction to a nullary construction. In terms of form, it maps each string-to-string function f to the string f everybody. In terms of meaning, it maps each individual-to-proposition function g to the proposition $\forall y.\, gy$. This idea let us analyze 'everybody saw Mary' and 'Mary saw everybody', but does not alone generate 'everybody saw everybody' because this meta-construction only applies to unary constructions.

To resolve this issue, it may seem natural to allow 'quantifying in' any argument position of an n-ary construction, mapping it to an $(n-1)$-ary construction (Hendriks 1993). However, an analogy between surface scope in quantification and left-to-right evaluation in other linguistic side effects (Shan and Barker 2006) suggests only 'quantifying in' the last argument. We then generate only surface scope for (15).

(15) Somebody saw everybody.

Where does inverse scope come from, then? Mixed quotation offers one answer: we can generate inverse scope if we can quote the (wider) scope of the later quantifier as a construction, excluding that quantifier itself. For example, we can analyze (15) as (16) if we can mixed quote the unary construction 'somebody saw –', *hereby* used to mean the property of having been seen by somebody. The resulting interpretation can be glossed as (17) (which is coherent, unlike (18)—pace Quine (1960)).

(16) !⌜Somebody saw %[everybody]⌝

(17) For everybody y, the sentence ⌜Somebody saw %[y]⌝ is true.

(18) For everybody y, the sentence ⌜Somebody saw %[y]⌝ has eight letters.

Because the more-quoted quantifier takes narrower scope above, one might worry about a mixed-quoted quantifier taking inverse scope over an unquoted quantifier.

(19) The dean asked that a student 'accompany every professor'. (Cumming 2003)

In fact, because written quotation marks may not indicate every level of actual quotation, we can treat such examples in terms of the syntactic interjection of §1.3.

(20) The dean asked that !⌜!⌜~[%[⌜a student⌝]] accompany %[every professor]⌝⌝

This account of inverse scope lets us explain why polarity licensing requires not just that the licensor take scope over the licensee, but also that the licensor precede the licensee if they are clausemates (Ladusaw 1979). For example, though 'Alice introduced nobody to anybody' has a surface-scope reading, *'Alice introduced anybody to nobody' does not have an inverse-scope reading.

Our explanation assumes that a clause like 'Alice introduced anybody to Bob' and a construction like 'Alice introduced anybody to %[...]' are not quotable, even though they can appear as part of a larger quotable item (for example when preceded by 'nobody thinks'). Intuitively, they are not quotable because they are incomplete: they are unacceptable as utterances by themselves. This intuition can be enforced in one of two ways: either assign a different syntactic category or semantic type to a constituent that contains an unlicensed polarity item (Fry 1997), or always insert a licensor and a licensee in one fell meta-construction. If there is no construction 'Alice introduced anybody to %[...]' to quote, then the strategy for generating inverse scope in (16) fails. Hence the paraphrase (22) of (21), analogous to (17), is unacceptable.

(21) *![Alice introduced anybody to %[nobody]]

(22) *For nobody y, the sentence ⌜Alice introduced anybody to %[y]⌝ is true.

Acknowledgements

Thanks to Mark Baker, Chris Barker, David Dowty, Michael Johnson, Oleg Kiselyov, Eli Bohmer Lebow, Ernie Lepore, Emar Maier, Ken Safir, Roger Schwarzschild, Stuart Shieber, Matthew Stone, Dylan Thurston, and the Rutgers linguistics department.

Bibliography

Cumming, S.: 2003, Two accounts of indexicals in mixed quotation, in P. de Brabanter (ed.), *Hybrid Quotations*, pp 77–88, Belgian Journal of Linguistics 17(1)

Davidson, D.: 1979, Quotation, *Theory and Decision* 11(1), 27–40

Fry, J.: 1997, Negative polarity licensing at the syntax-semantics interface, in P. R. Cohen and W. Wahlster (eds.), *Proceedings of the Annual Meeting of the Association for Computational Linguistics and 8th Conference of the European Chapter of the Association for Computational Linguistics*, pp 144–150

Geurts, B. and Maier, E.: 2003, Quotation in context, in P. de Brabanter (ed.), *Hybrid Quotations*, pp 109–128, Belgian Journal of Linguistics 17(1)

Hendriks, H.: 1993, *Studied Flexibility: Categories and Types in Syntax and Semantics*, Ph.D. thesis, Universiteit van Amsterdam

Kripke, S. A.: 1980, *Naming and Necessity*, Harvard University Press, Cambridge

Ladusaw, W. A.: 1979, *Polarity Sensitivity as Inherent Scope Relations*, Ph.D. thesis, University of Massachusetts, Reprinted by New York: Garland, 1980

Maier, E.: 2007, Mixed quotation: Between use and mention, in K. Yoshimoto (ed.), *Proceedings of the 4th International Workshop on Logic and Engineering of Natural Language Semantics*, Japanese Society of Artificial Intelligence

Quine, W. V. O.: 1960, *Word and Object*, MIT Press, Cambridge

Shan, C.-c. and Barker, C.: 2006, Explaining crossover and superiority as left-to-right evaluation, *Linguistics and Philosophy* 29(1), 91–134