Peter Smith, *Introduction to Formal Logic* (CUP, 2nd edition)

Exercises 11: Quotation

(a) *Where necessary, insert quotation marks into the following in accord with the strict convention for quotation, to make the resulting sentences come out true.*

(1) *The first word in this sentence is the.*

The first word in this sentence is 'the'.

(2) *This is not a verb, but is is.*

'This' is not a verb, but 'is' is.

(3) *George Orwell is the same person as Eric Blair.*

(Correct as it stands.)

(4) *George Orwell was Eric Blair's pen-name.*

'George Orwell' was Eric Blair's pen-name.

(5) *The Evening Star and The Morning Star denote the same planet, namely Venus.*

'The Evening Star' and 'The Morning Star' denote the same planet, namely Venus.

(6) *Sappho is the name of a Greek poet.*

'Sappho' is the name of a Greek poet.

(7) *If we want to refer not to Sappho but her name, we need to use the expression Sappho.*

If we want to refer not to Sappho but her name, we need to use the expression "'Sappho'".

(8) $\wedge$ *means much the same as and.*

'$\wedge$' means much the same as 'and'.

(9) P *can be interpreted as meaning that grass is green.*

'P' can be interpreted as meaning that grass is green.

(10) P *is a subformula of* $(\mathsf{Q} \wedge \neg\mathsf{P})$.

'P' is a subformula of '$(\mathsf{Q} \wedge \neg\mathsf{P})$'.

(11) *If* $(\mathsf{Q} \wedge \neg\mathsf{P})$ *is a subformula of a wff* α *so is* P.

If '$(\mathsf{Q} \wedge \neg\mathsf{P})$' is a subformula of a wff α so is 'P'.

(Comment: the PL wffs are being mentioned, by the schematic alpha is being *used* to do generalizing work in the meta-language.)

(12) *If* α *and* β *are* PL *wffs, so is their conjunction.*

(Correct as it stands.)

(13) *The result of substituting the atomic wff* P *for the schematic letter in* $\neg\neg\alpha$ *is* $\neg\neg\mathsf{P}$.

The result of substituting the atomic wff 'P' for the schematic letter in '$\neg\neg\alpha$' is

'$\neg\neg\mathsf{P}$'.

(Comment: this time the schema alpha is being talked about rather than used, so it is in quotation marks.)

(14) *The schema* $(\alpha \wedge \beta)$ *is formed from Greek letters, the connective* $\wedge$*, and the brackets (and).*

The schema '$(\alpha \wedge \beta)$' is formed from Greek letters, the connective '$\wedge$', and the

brackets '(' and ')'.

(15) *If a wff has the form* $(\alpha \wedge \neg\alpha)$ *it is self-contradictory.*

If a wff has the form '$(\alpha \wedge \neg\alpha)$' it is self-contradictory.

(b*) *In his* Mathematical Logic*, Quine defines what he calls* quasi-quotes *and what we call* Quine quotes*. Slightly changing his example he says that the expression* $\ulcorner(\alpha \land \beta)\urcorner$ *"amounts to quoting the constant contextual backgrounds, '( )' and ' ∧ ', and imagining the unspecified expressions* α *and* β *written in the blanks." Guided by what Quine says about this particular example, explain more carefully the use of Quine quotes, with further examples.*

Quine quotes are widely used by logicians, and indeed in some computer languages.

Taking Quine's example, the idea comes to this.

$\ulcorner(\alpha \land \beta)\urcorner$

is short for

> The result of writing '(' followed by the wff α followed by '∧' followed by the wff β followed by ')'

(we'll let spacing look after itself!). Or equivalently, it is short for

> The result of concatenating '(' , α,'∧', β, ')'.

Note then that in specifying *what* is to be concatenated we *mention* the object-language symbols but we *use* the metalinguistic variables.

So if α is specified to be the wff 'P' and β is specified to be the wff '(Q ∨ ¬R)', then we use

$\ulcorner(\alpha \land \beta)\urcorner$

to denote

(P ∧ (Q ∨ ¬R)).

Similarly, when we say, to take a simple case with an explicit generalization,

> for any wff α, α is equivalent to $\ulcorner\neg\neg\alpha\urcorner$,

this is short for

> for any wff α, α is equivalent to the result of writing '¬' followed by '¬' followed by α,

or equivalently to

> for any wff α, α is equivalent to the result of concatenating '¬', '¬', α.

We could put it this way, then. Putting Quine quotes round a mixed string of symbols from an object language and variables from a metalanguage denotes the result of concatenating in the same order those same object-language symbols with what is represented by those metalanguage symbols.

This means, by the way, that putting an object language wff in Quine quotes is just the same as putting it ordinary quotes!