

## **THE SEMANTICOSYNTACTIC BRIDGE**

**By**

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In order to state the problem to be tackled in this paper, I propose to make contact with four texts on English Language and linguistics. The intended contact pertains to their treatment of role theory.

In their influential grammar of the English language Quirk et al (1985: 741) duly remind us that analysis of participant roles has not achieved a general consensus, nor has it fully explored all distinctions ... [their] description must therefore be considered tentative.

On the other hand, Brown and Miller (1991: 308) justify their description of role theory by “its offering a degree of both generality and particularity [although] it has no easily defended validity ... [and] there seems to be no alternative in the current state of knowledge.”

While Fromkin et al (2003: 192) prefix their list of roles with a reassurance to the effect that “the list is not complete”, Larson and Segal’s (1995: 489) considered stance on the nature and number of semantic roles is the most pessimistic, for they write:

The upshot is that we regard the question of which thematic roles there are and how they are defined as empirical ones, to be resolved in the usual way: by investigations that construct specific theories making detailed and specific predictions. Preliminary theories of this kind have been proposed; however, it is likely that resolving thematic roles precisely will require a great deal of investigation, involving domains beyond linguistics. It is worth remembering that fully 22 centuries elapsed between the first suggestion of the atomic theory of matter, in which all substances were factored into earth, water, air, and fire, and the elaboration of atomic theory by John Dalton, in which a more complete and satisfactory set of atomic constituents was proposed. Finding elementary constituents can evidently be a long-term project.

Admittedly, the development of atomic theory was tortuous; but we need not resign ourselves to a similar state-of-affairs with regard to role theory. The objective I am poised to pursue in this paper is to bring the problem of determination of semantic roles closer to its solution by enunciating a theory of roles.

I posit four semantic domains, fifteen semantic categories, and fifteen semantic roles. The adjoining Table 1 shows a taxonomy of the domains, and the categories and roles which populate the domains in ascending complexity.

TABLE 1: SEMANTIC DOMAINS

I	Nonphysical Domain s, p, l, n, g Q, D, E, G, H, M, P, R, S, T
II	Inorganic Domain k, c, m, r, t B, C
III	Organic Domain v, f, z
IV	Human Domain a, h N = N <sup>1</sup> , N <sup>2</sup> , N <sup>3</sup> W = W <sup>1</sup> , W <sup>2</sup> , W <sup>3</sup> A = A <sup>1</sup> , A <sup>2</sup> , A <sup>3</sup>

In Domain I, s = state, p = proposition, l = space, n = number, g = set (category aggregate); Q = nonvolitional nonchange bearer, D = direction, E = effect (consequence), G = goal, H = possessum, M = mediator, P = meronym (part), R = reference, S = source, T = theme.

In Domain II, k = change, c = causation, m = matter, r = material object, t = time; B = nonvolitional change bearer, C = nonvolitional causer.

In Domain III, v = biotic matter, f = plant, z = animal.

In Domain IV, a = action, h = human being; N = volitional nonchange bearer, W = volitional change bearer, A = volitional causer (i. e. agent). N<sup>1</sup>, W<sup>1</sup> and A<sup>1</sup>; N<sup>2</sup>, W<sup>2</sup> and A<sup>2</sup>; N<sup>3</sup>, W<sup>3</sup> and A<sup>3</sup> are practical, emotional and cognitive respectively.

If we let  $\Omega = Q, N; B, W; C, A;$  and

$$\Phi = D, E, G, H, M, P, R, S, T$$

then if  $\epsilon_1, \epsilon_2,$  and  $\epsilon_3$  are semantic categories, a minimal sentence in any natural language is formalizable as:

- SWFF (1) [ $\Omega\epsilon$ ]  
 SWFF (2) [ $\Omega\epsilon_1 \Phi\epsilon_2$ ]  
 SWFF (3) [ $C\epsilon_1 \Omega\epsilon_2$ ]  
 SWFF (4) [ $C\epsilon_1 [\Omega\epsilon_2 \Phi\epsilon_3]$ ]  
 SWFF (5) [ $Ah \Omega\epsilon$ ]  
 SWFF (6) [ $Ah [\Omega\epsilon_1 \Omega\epsilon_2]$ ]  
 SWFF (7) [ $Ah [C\epsilon_1 \Omega\epsilon_2]$ ]

SWFF(1) – (7) are the semantic well-formed formulae in the theory under construction.

I now turn to the task of exemplifying SWFF(1) – (7) as far as data from Quirk et al (1985: 754) sentences (1) – (39), Brown and Miller (1991: 309) sentences (40) – (57) and Fromkin et al (2003: 192 – 3) sentences (58) – (66) allow. For each example sentence I shall reproduce the role analysis of the respective authors, and at once formalize it in my theory. For instance sentence (33) below will be treated as:

- 33(a) He [**agent**] (h) placed it [**aff**] (r) on the shelf [**loc**] (l).  
 (b) A<sup>1</sup>hBrGl

In the square brackets above I indicate the analysis of Quirk et al while my entity analysis is in round brackets. The whole sentence is then formalized as shown in 33(b). The abbreviations adopted in Quirk et al (1985: 754) are as follows:

<b>aff(ected)</b>	<b>ext(ernal causer)</b>	<b>pos(itioner)</b>
<b>agent(ive)</b>	<b>instr(ument)</b>	<b>recip(ient)</b>
<b>attrib(ute)</b>	<b>(prop) it</b>	<b>result(ant)</b>
<b>cog(nate)</b>	<b>loc(ative)</b>	<b>temp(oral)</b>
<b>event(ive)</b>		

- 1(a) She [**aff**] (h) is happy [**attrib**] (N).  
 (b) N<sup>2</sup>h

- 2(a) He [**agent**] (h) turned traitor [**attrib**] (W).  
 (b) Wh

- 3(a) The Sahara [**loc**] (l) is hot [**attrib**] (Q).  
 (b) Ql

- 4(a) Last night [**temp**] (t) was warm [**attrib**] (Q).  
(b) Qt
- 5(a) The show [**event**] (g) was interesting [**attrib**] (Q).  
(b) Qg
- 6(a) It [**it**] (e) is windy [**attrib**] (Q).  
(b) Qe
- 7(a) He [**aff**] (h) was at school [**loc**] (l).  
(b) NhRl
- 8(a) She [**agent**] (h) got into the car [**loc**] (l).  
(b) W<sup>1</sup>hGl
- 9(a) He [**pos**] (h) is lying on the floor [**loc**] (l).  
(b) N<sup>1</sup>hRl
- 10(a) The meeting [**event**] (g) is at eight [**temp**] (t).  
(b) QgRt
- 11(a) He [**agent**] (h) was working.  
(b) Ah
- 12(a) She [**pos**] (h) is standing.  
(b) N<sup>1</sup>h
- 13(a) The curtains [**aff**] (r) disappeared.  
(b) Br
- 14(a) The wind [**ext**] (g) is blowing.  
(b) Bg
- 15(a) It [**it**] (g) raining.  
(b) Bg
- 16(a) He [**agent**] (h) threw the ball [**aff**] (r).  
(b) A<sup>1</sup>hBr
- 17(a) Lightning [**ext**] (g) struck the house [**aff**] (l).  
(b) CgBl
- 18(a) He [**pos**] (h) is holding a knife [**aff**] (r).  
(b) A<sup>1</sup>hQr

- 19(a) The stone [**instr**] ( $r_1$ ) broke the window [**aff**] ( $r_2$ ).  
 (b)  $Cr_1Br_2$
- 20(a) She [**recip**] ( $h$ ) has a car [**aff**] ( $r$ ).  
 (b)  $NhHr$
- 21(a) We [**agent**] ( $h_1$ ) paid the bus driver [**recip**] ( $h_2$ ).  
 (b)  $A^1h_1Wh_2$
- 22(a) The will [**instr**] ( $g$ ) benefits us [**recip**] ( $h$ ) all.  
 (b)  $QgRh$
- 23(a) They [**agent**] ( $h$ ) climbed the mountain [**loc**] ( $l$ ).  
 (b)  $A^1Bl$
- 24(a) The bus [**loc**] ( $r$ ) seats thirty [**aff**] ( $h$ ).  
 (b)  $NhRr$
- 25(a) They [**agent**] ( $h$ ) fought a clean fight [**cog**] ( $g$ ).  
 (b)  $A^1hEg$
- 26(a) I [**agent**] ( $h$ ) wrote a letter [**result**] ( $r$ ).  
 (b)  $A^1hEr$
- 27(a) They [**agent**] ( $h$ ) had an argument [**event**] ( $g$ ).  
 (b)  $A^3hEg$
- 28(a) He [**agent**] ( $h$ ) nodded his head [**instr**] ( $r$ ).  
 (b)  $A^1hBr$
- 29(a) He [**agent**] ( $h_1$ ) declared her [**aff**] ( $h_2$ ) the winner [**attrib**].  
 (b)  $Ah_1E[Wh_2]$
- 30(a) The sun [**ext**] ( $r_1$ ) turned it [**aff**] ( $r_2$ ) yellow [**attrib**].  
 (b)  $Cr_1Br_2$
- 31(a) The revolver [**instr**] ( $r$ ) made him [**aff**] ( $h$ ) afraid [**attrib**].  
 (b)  $CrWh$
- 32(a) I [**recip**] ( $h$ ) found it [**aff**] ( $r$ ) strange [**attrib**].  
 (b)  $W^2hT[Qr]$
- 33(a) He [**agent**] ( $h$ ) placed it [**aff**] ( $r$ ) on the shelf [**loc**] ( $l$ ).  
 (b)  $A^1hBrGl$

- 34(a) The storm [**ext**] (g) drove the ship [**aff**] (r) ashore [**loc**] (l).  
 (b) CgBrGl
- 35(a) A car [**instr**] (r<sub>1</sub>) knocked it [**aff**] (r<sub>2</sub>).  
 (b) Cr<sub>1</sub>Br<sub>2</sub>
- 36(a) I [**recip**] (h) prefer them [**aff**] (r<sub>1</sub>) on toast [**loc**] (r<sub>2</sub>).  
 (b) N<sup>2</sup>hT[Qr<sub>1</sub>Rr<sub>2</sub>]
- 37(a) I [**agent**] (h<sub>1</sub>) bought her [**recip**] (h<sub>2</sub>) a gift [**aff**] (r).  
 (b) A<sup>1</sup>h<sub>1</sub>BrRh<sub>2</sub>
- 38(a) She [**agent**] (h) gave the door [**aff**] (r) a kick [**event**] (g).  
 (b) A<sup>1</sup>hCgBr
- 39(a) She [**agent**] (h<sub>1</sub>) knitted me [**recip**] (h<sub>2</sub>) a sweater [**result**] (r).  
 (b) A<sup>1</sup>h<sub>1</sub>ErRh<sub>2</sub>
- 40(a) She [**Agent**] (h) was singing.  
 (b) Ah
- 41(a) The string [**Patient**] (r) broke.  
 (b) Br
- 42(a) John [**Agent**] (h) sharpened the knife [**Patient**] (r).  
 (b) A<sup>1</sup>hBr
- 43(a) The dog [**Agent**] (z) is digging a hole [**Result**] (l).  
 (b) CzEl
- 44(a) Harold [**Agent**] (h) ran a mile [**Range**] (l).  
 (b) W<sup>1</sup>hMl
- 45(a) Susan [**Agent**] (h) went to Denmark [**Locative Goal**] (l).  
 (b) W<sup>1</sup>hGl
- 46(a) Yasuko [**Agent**] (h) is arriving from Kyoto [**Locative Source**] (l).  
 (b) W<sup>1</sup>hSl
- 47(a) Helen [**Agent**] (h) traveled via Samarkand [**Locative Path**] (l).  
 (b) W<sup>1</sup>hMl
- 48(a) She [**Agent**] (h<sub>1</sub>) gave the book (r) to Bill [**Patient Goal**] (h<sub>2</sub>).  
 (b) A<sup>1</sup>h<sub>1</sub>W<sup>1</sup>h<sub>2</sub>Hr

49(a) I [**Agent**] (h<sub>2</sub>) got the cassette (r) from David [**Patient Source**] (h<sub>1</sub>).  
(b) A<sup>1</sup>h<sub>1</sub>W<sup>1</sup>h<sub>2</sub>Hr

50(a) I [**Agent**] (h<sub>1</sub>) contacted Jane (h<sub>3</sub>) via her sister [**Patient Path**] (h<sub>2</sub>).  
(b) Ah<sub>1</sub>Bh<sub>3</sub>Mh<sub>2</sub>

51(a) The painting [**Neutral**] (r) cost £5,000 [**Range**] (g).  
(b) QrMg

52(a) Miranda [**Dative**] (h) knew all the answers [**Neutral**] (g).  
(b) N<sup>3</sup>Hg

53(a) Harriet [**Dative**] (h) owns a cat [**Neutral**] (z).  
(b) N<sup>1</sup>Hz

54(a) Celia [**Dative**] (h) is cold/ sad.  
(b) Nh

55 (a) The child [**Neutral**] (h) is sleeping.  
(b) Nh

56(a) The town [**Neutral**] (l) is dirty [**Attribute**].  
(b) Ql

57(a) Fiona [**Neutral**] (h) is the convener [**Role**].  
(b) Nh

58(a) Joyce [**Agent**] (h) ran.  
(b) W<sup>1</sup>h

59(a) Mary (h) found the puppy [**Theme**] (z).  
(b) W<sup>1</sup>hTz

60(a) It (g) rains in Spain [**Location**] (l).  
(b) BgRl

61(a) (h) put the cat (z) on the porch [**Goal**] (l).  
(b) A<sup>1</sup>hBzGl

62(a) He (h) flew from Iowa [**Source**] (l<sub>1</sub>) to Idaho (l<sub>2</sub>).  
(b) W<sup>1</sup>hSl<sub>1</sub>Gl<sub>2</sub>

63(a) Jo (h) cuts hair (r<sub>2</sub>) with a razor [**Instrument**] (r<sub>1</sub>)  
(b) A<sup>1</sup>hCr<sub>1</sub>Br<sub>2</sub>

64(a) Helen [**Experiencer**] (h<sub>1</sub>) heard Robert (h<sub>2</sub>) playing the piano (r).  
(b) W<sup>1</sup>h<sub>1</sub>T[Ah<sub>2</sub>Br]

65(a) The wind [**Causative**] (g) damaged the roof (r).  
(b) CgBr

66(a) The tail (r) of the dog [**Possessor**] (z) wagged furiously.  
(b) [B[QzHr]]Mk

Quirk et al (1985: 741 – 752) define their posited participants as follows:

- AGENTIVE: “the animate being instigating or causing the happening denoted by the verb”
- AFFECTED: “animate or inanimate which does not cause the happening denoted by the verb, but is directly involved in some other way”
- RECIPIENT: “the animate being that is passively implicated by the happening or state”
- ATTRIBUTE: “the typical semantic role of a subject complement and an object complement”
- EXTERNAL CAUSER: “the unwitting (generally inanimate) cause of an event”
- INSTRUMENT: “the entity (generally inanimate) which an agent uses to perform an action or instigate a process”
- POSITIONER: “the subject may have the role of POSITIONER with intransitive stance verbs ... and with transitive verbs related to stance verbs ... The transitive verbs are causative and the direct objects that follow them have an affected role. In this positioner role the participant is in control, but the situation is not resultative in that no change is indicated in the positioner during the period in which the situation lasts.”
- LOCATIVE: “the place of the state or action”
- TEMPORAL: “[the] time [of the state or action]”
- EVENTIVE: “the noun at the head of the noun phrase (of a subject) is commonly deverbal ... or a nominalization”
- PROP *IT*: “[time, atmospheric, and distance *it*] has little or no semantic content”
- RESULTANT: “is an object whose referent exists only by virtue of the activity indicated by the verb”

- COGNATE: “is similar to a resultant object in that it refers to an event indicated by the verb”

Fromkin et al (2003: 192 – 3) define their stipulated roles as follows:

- AGENT: “the one who performs an action”
- THEME: “the one or thing that undergoes an action”
- LOCATION: “the place where an action happens”
- GOAL: “the place to which an action is directed”
- SOURCE: “the place from which an action originates”
- INSTRUMENT: “the means by which an action is performed”
- EXPERIENCER: “one who perceives something”
- CAUSATIVE: “a natural force that causes a change”
- POSSESSOR: “one who has something”

On my part I define roles as follows:

TABLE 2:

	Nonvolitional	Volitional
Nonchange bearer	Q	$N = N^1, N^2, N^3$
Change bearer	B	$W = W^1, W^2, W^3$
Causer	C	$A = A^1, A^2, A^3$

- Direction D (self-explanatory)
- Source S (self-explanatory)
- Goal G (self-explanatory)
- Mediator M (self-explanatory)
- Consequence/ Effect (self-explanatory)
- Reference R (self-explanatory)
- Part P (self-explanatory)
- Possessum H: that which is possessed
- Theme T: physical, emotional, or cognitive stimulus

Taken as representative of the many versions of semantic role theory including those not discussed here, the Quirkian and Fromkinian versions are defective in three main ways:

- (a) The prop *it* and **cognate** are not language-universal.
- (b) If we take conceptual meaning as a combination of categorial (i.e. entity) and relational (i.e. role) meanings, then **event, locative, and temporal** are not roles but rather entities.
- (c) The dichotomy *animate vs inanimate entities* is an irrelevant criterion for defining roles.

Consider further examples (67) - (100).

67(a) Susan resembles her mother. [Kroeger (2004: 10)]

(b) Qh<sub>1</sub>Rh<sub>2</sub>

68(a) John jumped into the well. [Kroeger (2004: 10)]

(b) W<sup>1</sup>h<sub>1</sub>Gl

69(a) Fatuma (h<sub>1</sub>) is Ali's boss (h<sub>2</sub>).

(b) Nh<sub>1</sub>Rh<sub>2</sub>

70(a) The rat died.

(b) Bz

71(a) The cat (z<sub>1</sub>) caused the rat (z<sub>2</sub>) to die.

(b) Cz<sub>1</sub>E[Bz<sub>2</sub>]

72(a) The cat (z<sub>1</sub>) killed the rat (z<sub>2</sub>).

(b) Cz<sub>1</sub>Bz<sub>2</sub>

73(a) Ali (h<sub>1</sub>) showed Fatuma (h<sub>2</sub>) a book (r).

(b) A<sup>1</sup>h<sub>1</sub>[W<sup>1</sup>h<sub>2</sub>Tr]

74(a) The teacher (h<sub>1</sub>) made Ali (h<sub>2</sub>) show Fatuma (h<sub>3</sub>) a book (r).

(b) A<sup>3</sup>h<sub>1</sub>E[A<sup>1</sup>h<sub>2</sub>[W<sup>1</sup>h<sub>3</sub>Tr]]

75(a) Through Ali (h<sub>2</sub>) the teacher (h<sub>1</sub>) showed Fatuma (h<sub>3</sub>) a book (r).

(b) Ah<sub>1</sub>[Ch<sub>2</sub>[Wh<sub>3</sub>Tr]]

76(a) Ali (h<sub>1</sub>) made Fatuma (h<sub>2</sub>) open the door (r).

(b) Ah<sub>1</sub>E[Ah<sub>2</sub>Br]

77(a) The headteacher (h<sub>1</sub>) got the parent (h<sub>2</sub>) to sign the report (r).

(b) Ah<sub>1</sub>E[Ah<sub>2</sub>Br]

78(a) The bone was given to the dog by the man.

(b) Ah<sub>1</sub>BrGz

79(a) 7 is an odd number.

(b)  $Q_n$

80(a) Ali (h) knows the theorem (g).

(b)  $NhHg$

81(a) Latex (v) oozed out of the rubber tree (f).

(b)  $BvSf$

82(a) The potter (h) made a pot (r) out of clay (m).

(b)  $AhErSm$

83(a) Ali ( $h_1$ ) made his daughter ( $h_2$ ) go home (l)

(b)  $Ah_1E[Wh_2Gl]$

84(a) Ali ( $h_1$ ) allowed his daughter ( $h_2$ ) to go home (l).

(b)  $Ah_1R[Wh_2Gl]$

85(a) Mass is equivalent to energy.

(b)  $Qg_1Rg_2$

86(a) Fatuma is intelligent.

(b)  $N^3h$

87(a) Ali owns an investment bank.

(b)  $NhHg$

88(a) The lawyer drafts a constitution.

(b)  $A^3hEg$

89(a) Fatuma represents the bank.

(b)  $NhRg$

90(a) Ali walks along the river.

(b)  $W^1hMI$

91(a)  $l_1$  is parallel to  $l_2$ .

(b)  $Ql_1Rl_2$

92(a)  $l_1$  cuts  $l_2$ .

(b)  $Ql_1Rl_2$

93(a) Ali ( $h_1$ ) saw a man ( $h_2$ ) who was opening the door ( $r_2$ ) with a key ( $r_1$ )

(b)  $W^1h_1T[Ah_2Cr_1Br_2]$

94(a) Ali ( $h_1$ ) remembers Fatuma ( $h_2$ ).

(b)  $W^3h_1Th_2$

95(a)  $h_1$  attacks  $h_2$ .

(b)  $Ah_1Wh_2$

96(a)  $h_1$  hits  $h_2$ .

(b)  $Ah_1Wh_2$

97(a)  $h_1$  hit  $h_2$  accidentally.

(b)  $Ch_1Wh_2$

98(a) Lightning struck  $h$ .

(b)  $CgWh$

99(a)  $l_1$  meets  $l_2$ .

(b)  $Ql_1Rl_2$

100(a) Ali ( $h_1$ ) hates Fatuma ( $h_2$ ).

(b)  $N^2h_1Th_2$

Careful examination of the syntactic functions and semantic roles in (1) – (100) leads to a bridge of semantics to syntax as exhibited in Table 3 using Š, Č, Ě, O, V for subject, complement, adverbial, object and verb respectively.

TABLE 3: SEMANTICOSYNTACTIC BRIDGE

Semantic Formula	Syntactic Function Pattern
$[\Omega\epsilon]$	$\langle\check{S}V\rangle \langle\check{S}V\check{C}\rangle$
$[\Omega\epsilon_1 \Phi\epsilon_2]$	$\langle\check{S}V\check{A}\rangle \langle\check{S}VO\rangle$
$[C\epsilon_1 \Omega\epsilon_2]$	$\langle\check{S}VO\rangle \langle\check{S}VO\check{C}\rangle$
$[C\epsilon_1 \Omega\epsilon_2 \Phi\epsilon_3]$	$\langle\check{S}VO\check{A}\rangle \langle\check{S}VOO\rangle$
$[Ah \Omega\epsilon]$	$\langle\check{S}VO\rangle \langle\check{S}VO\check{C}\rangle$
$[Ah \Omega\epsilon_1 \Phi\epsilon_2]$	$\langle\check{S}VO\check{A}\rangle \langle\check{S}VOO\rangle$
$[Ah C\epsilon_1 \Omega\epsilon_2]$	$\langle\check{S}VOO\rangle \langle\check{S}VO\check{A}\rangle$

To conclude this page, I have identified “domains beyond linguistics” (Larson & Segal (1995)) as domains which, according to academic convention, correspond to the disciplines of logic and mathematics [Domain I], physics and chemistry [Domain II], biology [Domain III] psychology and sociology [Domain IV]. Secondly, I have used volition, change and causation to develop a solution to the problem of defining semantic roles. Finally, having developed a system for semantic formalization, I have arrived at the semanticosyntactic bridge.

## References

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