THE SITUATODOMAINAL THEORY*

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ABSTRACT

The problem of determining the nature and number of semantic roles dates back to the mid-1960s as the work of Charles Fillmore does evidence. The sole objective pursued in the present paper is to enunciate a theory of semantic roles that purports to resolve the aforementioned problem. The proposed solution resides in the parallel identification of the four types of Newtonian motion - - absolute, relative, contactive, and causative- - with exactly four types of predication in language. It is established that there are exactly four predicate types, exactly nine semantic roles, and exactly three argument types.

1. PRESENTING THE PROBLEM

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 propounding a so-called "situatodomainal theory". Taking my cue from Larson and Segal, I embark on the quest for semantic roles, in relevant areas beyond linguistics with extraordinary keenness on mechanics.

2. RELEVANT AREAS BEYOND LINGUISTICS

2.1 Newtonian Mechanics

Newton's Second Law of Motion or Newton II, for short, states that if an external resultant force **F** acts on a body of mass m moving with a velocity **v**, then

$$\mathbf{F} = k\,\frac{d(m\mathbf{v})}{dt}\ , \text{ where } k = \text{constant.}$$

For $k = 1$, $\mathbf{F} = \frac{d(m\mathbf{v})}{dt} = m\frac{d\mathbf{v}}{dt} + \mathbf{v}\frac{dm}{dt}$.

For $\frac{dm}{dt} = 0$, $\mathbf{F} = m\mathbf{a}$, where $\mathbf{a} = \frac{d\mathbf{v}}{dt}$; **a** is the acceleration.

For $\mathbf{F} = m\mathbf{a} = \mathbf{0}$, we obtain Newton I.

Newton I is obeyed if and only if either statically $\mathbf{v} = \mathbf{0}$ for the absolute or relative rest of the body; or dynamically, **v** = constant for the absolute or relative motion of the body.

For two bodies 1 and 2, Newton II assumes the form $\mathbf{F}_{12} + \mathbf{F}_{21} = m\mathbf{a}$, where $\mathbf{F}_{12}$ is the force on body 1 exerted by body 2 while $\mathbf{F}_{21}$ is the force on body 2 exerted by body 1. Putting $\mathbf{F}_{12} + \mathbf{F}_{21} = m\mathbf{a} = \mathbf{0}$, we obtain Newton III. Newton III is obeyed such that both bodies are in contact either statically, $\mathbf{F}_{12} = -\mathbf{F}_{21}$; or dynamically, $m_1\mathbf{v}_1 + m_2\mathbf{v}_2 = m_1\mathbf{v}'_1 + m_2\mathbf{v}'_2$ [i.e. conservation of momentum of two colliding bodies].

If $\mathbf{F} = m\mathbf{a} \neq \mathbf{0}$, $\mathbf{v} \neq$ constant for either absolute or relative motion of a body.

If $\mathbf{F}_{12} + \mathbf{F}_{21} = m\mathbf{a} \neq \mathbf{0}$, $\mathbf{v} \neq$ constant for the motion of the body of mass m.

In summary, absolute, relative or contactive motion is caused by Newtonian forces.

2.2 Entities and Situations

An entity $\in$ is that which is, while a situation σ is a state – of – affairs in which entities are related.

We turn to the discipline of logic and mathematics to identify non-material entity types ν :

(1) proposition p
(2) space ℓ ("length")
(3) quantity q
(4) set u ("unit")
(5) number n
(6) intensity i

In order to study physics, chemistry and biology we need the following material entity types μ :

(7) matter m
(8) time t
(9) abiotic material object r ("res")
(10) biotic material object o ("organ")
(11) plant b ("botany")
(12) animal z ("zoology")
(13) human h
(14) material artifact a

Finally, we turn to psychology for mental entity types γ (Ger **Geist** "mind"):

(15) percept e ("experience")
(16) cognition c

(17) emotion f ("feeling")
(18) judgment j
(19) psychomotor v ("vita")
(20) communication s ("speech ", "sign")
(21) (mental) artifact a

3. PRELIMINARY EXPLICATION OF PIVITAL CONCEPTS

In this Section I wish to pave the way for the enunciation of the theory in Section 4 by, at least, informally characterizing or describing the semantic roles envisaged. But first and foremost I shall subsume both "entity" and "situation" under the term "argument". The roles to be posited in the theory are as follows:

(1) B ("become") : change bearer in a situation
(2) Z ("zero") : non-change bearer in a situation
(3) R : reference
(4) D : direction
(5) J ("jointly") : comitative
(6) S : source
(7) M : mediate
(8) G : goal
(9) O ("on") : surficial
(10) Y (Luganda **okuYINGILA** "enter") : internal
(11) X ('extra") : external
(12) W ("way") : range
(13) P : part-of
(14) U ("upper") : augmentative
(15) I ("iso-") : equative
(16) L ("lower") : diminutive

(17)	N	("knocker")	:	dynamic contactor
(18)	T	("toucher")	:	static contactor
(19)	A	("affected")	:	contacted
(20)	C		:	causer
(21)	K		:	anticauser
(22)	E		:	effected

In anticipation of what will transpire in the next Section it will be convenient to regroup the semantic roles (1)-(22) as follows:

Σ = B, Z ; χ = R, D, J, S, M , G, O, Y , X, W, P, U, I, L ; ψ = N , T; A ; Φ = C, K ; E

To complete this Section I introduce five definitions Def 1-5.

Def 1: A predicate π is a combination of semantic roles such that
$\pi = \theta_1 \ldots \theta_n$, where π = predicate, θ_1,θ_n = first, …,nth roles.

Def 2: An argument η is either an entity $\in$ or situation σ.

Def 3: A domain δ is a quantity to which, in a given situation, an argument intrinsically belongs.

Def 4: A situation is defined according to:
$\sigma = \theta_1\eta_1(\delta_1)\ldots \theta_n\eta_n(\delta_n)$

Def 5: A semantic equation is defined according to:
$\theta_1\eta_1(\delta_1)\ldots \theta_n\eta_n(\delta_n) = \theta_1\eta_1(\sigma'') + \ldots \theta_n\eta_n(\sigma'')$

4. THE SITUATODOMAINAL THEORY

Axiom 1:
Linguistic signification at least parallels motion which is caused by Newtonian forces.

Axiom 2 :
There are exactly four basic predicate types:

(i) absolute [Σ]
(ii) relative [Σχ]
(iii) contactive [ψA]
(iv) causative [ΦE]

Axiom 3:
There are exactly three argument types"

(i)	non-material:	ν	=	p, l, q , u, n, i σ
(ii)	material :	μ	=	m, t, r, o, b, z, h, a, σ
(iii)	mental :	γ	=	e, c, f, j, v, s, a, σ

Axiom 4:
If $\theta_1\eta_1(\delta_1)\theta_2\eta_2(\delta_2) = \sigma$, then
$\theta_1\eta_1(\delta_1)\theta_2\eta_2(\delta_2) = \theta_1\eta_1(\sigma'') + \theta_2\eta_2(\sigma'')$

5. FORMALIZING SITUATIONS

I now analyze and formalize 85 situations in the situatodomainal language. The first twelve examples will go a long way to make the notion of domain more accessible. Explanatory notes will be appended to the formalizations.

(1.0) $\underset{h(m'')}{\underline{\text{Ali}}}$ **is (nonvolitionally) in contact with** $\underset{r(m'')}{\underline{\text{the box}}}$.
[TA]

(1.1) Th(m") Ar(m") **to be in contact with**
Two entities in the material domain are in contact.

(2.0) $\underset{h(e'')}{\underline{\text{Ali}}}$ **sees** $\underset{r(m'')}{\underline{\text{the box.}}}$
[NA]

(2.1) Nh(e″) Ar (m″) **to see**

Here, h in the perceptual domain is in contact with r which is in the material domain.

(3.0) Ali **knows** the box.
h(c″) [TA] r(m″)

(3.1) Th(c″) Ar (m″) **to know**

(4.0) Ali **remembers** the box.
h(c″) [NA] r(m″)

(4.1) Nh(c″)Ar(m″) **to remember**

(5.0) Ali **likes** the box.
h(j″) [TA] r(m″)

(5.1) Th(j″)Ar(m″) **to like**

(6.0) Ali **kicks** the box.
h(v″) [NA] r(m″)

(6.1) Nh(v″) Ar(m″) **to kick**

(7.0) Ali **has** a box.
h(h″) [TA] r(m″)

(7.1) Th(h″) Ar(m″) **to have**

(8.0) The patient **responded to** the drug.
h(o″) [NA] r(m″)

(8.1) Nh(o″) Ar(m″) **to respond to**

(9.0) Ali **meets** Fatuma.
h_1(h″) [NA] h_2(h″)

(9.1) Nh_1(h″)Ah_2(h″) **to meet**

(10.0) A comet **collided with** one of the planets.
$r_1(m'')$ $r_2(m'')$

(10.1) $Nr_1(m'')Ar_2(m'')$ **to collide with**

(11.0) Ali **calls** Fatuma.
$h_1(s'')$ $h_2(e'')$

(11.1) $Nh_1(s'')Ah_2(e'')$ **to call**

Here h_1 in the communicational domain gets in contact with h_2 in the perceptual domain.

(12.0) Ali endorses the agreement.
h (j″) r(s″)

(12.1) Th(j″)Ar(s″) **to endorse**

I now analyze and formalize 74 sentences, sixty-six of which are taken 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)). For the benefit of readers who are knowledgeable about Quirk et al's , Brown and Miller's and Fromkin et al's analyses, their respective sets of role labels precede my formalizations.

(13.0) She is happy.
Affected Attribute

(13.1 She **is** happy.
h(h″) [ZY] σ(f″)

(13.2 Zh(h″)Yσ (f″)

(14.0) He turned traitor.
Agentive Attribute

(14.1) He **turned** traitor.
h(h″) {BY] σ(j″)

(14.2) Bh(h″)Yσ(j″)

(15.0) The Sahara (Locative) is hot. (Attribute)

(15.1) The Sahara (ℓ(ℓ″)) **is** [ZY] hot. (σ(m″))

(15.2) Zℓ (ℓ″)Yσ(m″)

(16.0) Last night (Temporal) was warm. (Attribute)

(16.1) Last night (t(t″)) **was** [XY] warm. (σ(m″))

(16.2) Zt(t″)Yσ(m″)

(17.0) The show (Eventive) was interesting. (Attribute)

(17.1) The show (σ_1(ℓ″,t″,h″)) **was** [ZY] interesting. (σ_2(j″))

(17.2) Zσ_1(ℓ″,t″, h″)Yσ_2(j″)

(18.0) It (Prop *It*) is windy. (Attribute)

(18.1) It (σ_1(ℓ″,t″, m″)) **is** [ZY] windy. (σ_2(m″))

(18.2) Zσ_1(ℓ″,m″,t″)Yσ_2 (m″)

(19.0) He (Affected) was at school. (Locative)

(19.1) He (h(h″)) **was** [ZY} at school. (ℓ(h″))

(19.2) Zh(h″)Rℓ(h″)

(20.0) She got into the car.
Agentive Locative

(20.1) She **got into** the car.
h(v″) [BY] r(ℓ″)

(20.2) Bh(v″)Yr(ℓ″)

(21.0) He is lying on the floor.
Positioner Locative

(21.1) He **is lying on** the floor.
h(v″) [ZO] ℓ(ℓ″)

(21.2) Zh(v″)Oℓ(ℓ″)

(22.0) The meeting is at eight.
Eventive Temporal

(22.1) The meeting **is at** eight.
σ(t″,h″) [ZR] t(t″)

(22.2) Zσ(t″,h″)Rt(t″)

(23.0) He was working.
Agentive

(23.1) He **was working**.
h(γ″) [Φ]

(23.2) Φh(γ″)

(24.0) She is standing.
Positioner

(24.1) She **is standing**.
h(v″) [Z]

(24.2) Zh(v″)

(25.0) The curtains disappeared.
Affected

(25.1) The curtains **disappeared.**
r(ℓ″) [B]

(25.2) Br(ℓ″)

(26.0) The wind is blowing.
External Causer

(26.1) The wind **is blowing**.
σ(ℓ″,m″,t″) [B]

(26.2) Bσ(ℓ″,m″t″)

(27.0) It is raining.
Prop *It*

(27.1) It **is raining**.
σ(ℓ″,m″,t″) [B]

(27.2) Bσ(ℓ″,m″,t″)

(28.0) He threw the ball.
Agentive Affected

(28.1) He **threw** the ball.
h(v″) CE[B] r(ℓ″)

(28.2) Ch(v″)E[Br(ℓ″)]

(29.0) Lightning struck the house.
External Causer Affected

(29.1) Lightning **struck** the house.
σ(ℓ″,t″) [NA] r(ℓ″)

(29.2) Nσ(ℓ″,t″)Ar(ℓ″)

(30.0) He is holding a knife.
Positioner Affected

(30.1) He **is holding** a knife.
h(v″) KE[Z] r(ℓ″)

(30.2) Kh(v″)E[Zr(ℓ″)]

(31.0) The stone broke the window.
Instrument Affected

(31.1) The stone **broke** the window.
$r_1(m'')$ CE[B] $r_2(\ell'')$

(31.2) C$r_1(m'')$E[B $r_2(\ell'')$]

(32.0) She has a car.
Recipient Affected

(32.1) She **has** a car.
h(v″) [TA] r(m″)

(32.2) Th(v″)Ar(m″)

(33.0) We paid the bus driver.
Agentive Recipient

(33.1) We **paid** the bus driver.
$h_1(\gamma'')$ CE[N] $h_2(v'')$

(33.2) C$h_1(\gamma'')$E[N$h_2(v'')$]

(34.0) The will benefits us all.
Instrument Recipient

(34.1) We all like the will.
h(j″) [TA] s(s″)

(34.2) Th(j″)A s(s″)

(35.0) They climbed the mountain.
Agentive Locative

(35.1) They **climbed** the mountain.
h(v″) [NA] ℓ(ℓ″)

(35.2) Nh(v″)Aℓ(ℓ″)

(36.0) The bus seats thirty.
Locative Affected

(36.1) Thirty **can sit in** the bus.

h(h″) [ZY] r(ℓ″)

(36.2) Zh(h″)Yr(ℓ″)

(37.0) They fought a clean fight.
Agentive Cognate

(37.1) They **fought** cleanly.
h_1(γ″) [NJ] σ(j″)

(37.2) Nh_1(γ″)Jσ(j″)

(38.0) I wrote a letter.
Agentive Resultant

(38.1) I **wrote** a letter.
h(v″) CE[B] r(s″)]

(38.2) Ch(v″) E[Br(s″)]

(39.0) They had an argument.
Agentive Eventive

(39.1) They **argued**.
(h(s″) [N]

(39.2) Nh(s″)

(40.0) He nodded his head.
Agentive Instrument

(40.1) He **nodded** his head.
h(s″) CE[B] o(ℓ″)]

(40.2) Ch(s″)E[Bo(ℓ″)]

(41.0) He declared her the winner.
Agentive Affected Attribute

(41.1) He declared: "She is the winner".
h_1(s″) NA[ZY] h_2(h″) σ(h″)

(41.2) Nh_1(s″)A[Zh_2(h″)Yσ(h″)]

(42.0) The sun turned it yellow.
External causer Affected Attribute

(42.1) The sun turned it yellow.
$r_1(m'')$ CE[BY] $r_2(m'')$ $\sigma(m'')$

(42.2) $Cr_1(m'')E[Br_2(m'')Y\sigma(m'')]$

(43.0) The revolver made him afraid.
Instrument Affected Attribute

(43.1) The revolver made him afraid.
$r(m'')$ CE[BY] $h(h'')$ $\sigma(f'')]$

(43.2) $Cr(m'')E[Bh(h'')Y\sigma(f'')]$

(44.0) I found it strange.
Recipient Affected Attribute

(44.1) I f**ound** it strange.
$h(j'')$ NA[ZY] $\eta(\delta)$ $\sigma(j'')$

(44.2) $Nh(j'')$ $A[Z\eta(\delta)Y\ \sigma(j'')]$

(45.0) He placed it on the shelf.
Agentive Affected Locative

(45.1) He **placed** it **on** the shelf.
$h(v'')$ CE[BO] $r_1(m'')$ $r_2(\ell'')$

(45.2) $Ch(v'')E[Br_1(m'')Or_2(\ell'')]$

(46.0) The storm drove the ship ashore.
External Causer Affected Locative

(46.1) The storm drove the ship ashore.
$\sigma(\ell''m''t'')$ CE[BG] $r(m'')$ $\ell(\ell'')$

(46.2) $C\sigma(\ell''m''t'')E[Br(m'')G\ell(\ell'')]$

(47.0) A car knocked it down.
Instrument Affected Locative

(47.1) A car knocked it down
r1(m″) CE[BG] r2(m″) ℓ(ℓ″)]

(47.2) C r 1(m″)E[B r 2(m″)Gℓ(ℓ″)]

(48.0) I prefer them on toast.
Recipient Affected Locative

(48.1) I **prefer** them **on** toast.
h(j″) [TA[ZO]] r1(m″) r2(m″

(48.2) Th(j″)A[Zr1(m″)Or2(m″)]

(49.0) I bought her a gift.
Agentive Recipient Affected

(49.1) (Someone) sold to me a gift for her.
h1(v″) CE[[NA]R] h2(v″) r(m″)] h3(h″)

(49.2) Ch1(v″)E[[Nh2(v″)Ar(m″)]Rh3(h″)]

(49.3) I bought her a gift.
h2(v″) CE[[NA]R] h3(h″) r(m″)

(50.0) She gave the door a kick.
Agentive Affected Eventive

(50.1) She kicked the door.
h(v″) [NA] r(m″)

(50.2) Nh(v″)Ar(m″)

(51.0) She knitted me a sweater.
Agentive Recipient Resultant

(51.1) She **knitted** a sweater for me.
h1(v″) CE[BR] r(m″) Rh2(h″)]

(51.2) Ch1(v″) E[Br(m″)Rh2(h″)]

(52.0) She was singing.
Agent

(52.1) She **was singing**.
h(s″) [N]

(52.2) Nh(s″)

(53.0) The string broke.
Patient

(53.1) The string **broke**.
r(m″) [B]

(53.2) Br(m″)

(54.0) John sharpened the knife.
Agent Patient

(54.1) John **sharpened** the knife.
h(v″) CE[B] r(m″)

(54.2) Ch(v″)E[Br(m″)]

(55.0) The dog is digging a hole.
Agent Result

(55.1) The dog **is digging** a hole.
z(v″) CE[B] ℓ(ℓ″)

(55.2) Cz(v″)E[Bℓ(ℓ″)]

(56.0) Harold ran a mile.
Agent Range

(56.1) Harold **ran** a mile.
h(v″) [BW] ℓ(ℓ″)

(56.2) Bh(v″)Wℓ(ℓ″)

(57.0) Susan went to Denmark.
Agent Locative Goal

(57.1) Susan **went to** Denmark.
h(h″) [BG] ℓ(ℓ″)

(57.2) Bh(h″)Gℓ(ℓ″)

(58.0) Yasuko is arriving from Kyoto.
Agent Locative Source

(58.1) Yasuko **is arriving from** Kyoto.
h(h″) [BS] ℓ(ℓ″)

(58.2) Bh(h″)Sℓ(ℓ″)

(59.0) Helen traveled via Samarkand.
Agent Locative Path

(59.1) Helen **traveled via** Samarkand.
h(h″) [BM] ℓ(ℓ″)

(59.2) Bh(h″)Mℓ(ℓ″)

(60.0) She gave the book to Bill.
Agent Patient Goal

(60.1) She **gave** the book **to** Bill.
h_1(v″) CE[NA] r(s″) h_2(v″)

(60.2) Ch_1(v″) E[Nh_2(v″)Ar(s″)]

(61.0) I **got** the cassette **from** David.
Agent Patient Source

(61.1) David **gave** the cassette **to** me.
h_1(v″) CE[NA] r(s″) h_2(v″)

(61.2) Ch_1(v″) E[Nh_2(v″) Ar(s″)]

(61.3) I **got** the cassette **from** David.
h_2(v″) r(s″) h_1(v″)

(62.0) I contacted Jane via her sister.
Agent Patient Path

(62.1) I **contacted** Jane **via** her sister.
h_1(s″) [NA]M h_2(h″) h_3(h″)

(62.2) [Nh_1(s″) Ah_2(h″)]Mh_3(h″)

(63.0) The painting cost £5,000.
Neutral Range

(63.1) The painting **cost** £ 5,000.
$r_1(s'')$ [ZW] $r_2(w'')$

(63.2) $Zr_1(s'')\ Wr_2(w'')$

(64.0) Miranda knew all the answers.
Dative Neutral

Harriet owns a cat.
Dative Neutral

(64.1) Miranda **knew** all the answers.
h(c″) [TA] s(s″)

Harriet **owns** a cat.
h(h″) [TA] z(z″)

(64.2) Th(h″)Az(z″)

(65.0) Celia is cold/sad.
Dative

(65.1) Celia **is** cold/sad.
h(h″) [YZ] σ (f″)

(65.2) Zh(h″)Yσ (f″)

(66.0) The child is sleeping.
Neutral

(66.1) The child **is sleeping**.
h(o″) [Z]

(66.2) Zh(o″)

(67.0) The town is dirty.
Neutral Attribute

(67.1) The town **is** dirty .
ℓ(h″) [ZY] σ (o″)

(67.2) Zℓ(h″)Yσ (o″)

(68.0) Fiona is the convener.
Neutral Role

(68.1) Fiona **is** the convener.
h_1(h″) h_2(h″)

(68.2) Zh_1(h″) Ih_2(h″)

(69.0) Joyce ran.
Agent

(69.1) Joyce **ran**.
h(v″) [B]

(69.2) Bh(v″)

(70.0) Mary found the puppy.
Theme

(70.1) Mary **found** the puppy.
h(e″) z(z″)

(70.2) Nh(e″)Az(z″)

(71.0) It rains in Spain.
Location

(71.1) It **rains in** Spain.
σ(ℓ″,m″,t″) [BY] ℓ(ℓ″)

(71.2) Bσ(ℓ″,m″,t″) Yℓ(ℓ″)

(72.0) Put the cat on the porch.
Goal

(72.1) (You) **put** the cat **on** the porch.
h(v″) z(z″) ℓ(ℓ″)

(72.2) Ch(v″) E [Bz(z″)Oℓ(ℓ″)]

(73.0) He flew <u>from Iowa</u> to Idaho.
Source

(73.1) <u>He</u> **flew from** <u>Iowa</u> **to** <u>Idaho</u>.
h(v″) [BS]G $\ell_1(\ell'')$ $\ell_2(\ell'')$

(73.2) [Bh(v″) S$\ell_1(\ell'')$] G$\ell_2(\ell'')$

(74.0) Jo cuts hair <u>with a razor</u>.
Instrument

(74.1) <u>Jo</u> **cuts** <u>hair</u> **with** <u>a razor</u>.
h(v″) o(o″) r(m″)

(74.2) Ch(v″)E[Cr(m″)E[Bo(o″)]]

(75.0) <u>Helen</u> heard Robert playing the piano.
Experiencer

(75.1) <u>Helen</u> **heard** <u>Robert</u> **playing** <u>the piano</u>.
$h_1(e'')$ [NA] $h_2(v'')$ [NA] r(m″)

(75.2) $Nh_1(e'')$ A[$Nh_2(v'')$Ar(m″)]

(76.0) <u>The wind</u> damaged the roof.
Causative

(76.1) <u>The wind</u> **damaged** <u>the roof</u>.
σ(ℓ″,m″,t″) CE[B] r(m″)

(76.2) Cσ(ℓ″,m″,t″)E[Br (m″)]

(77.0) The tail of <u>the dog</u> wagged furiously.
Possessor

(77.1) <u>The dog's tail</u> **wagged** <u>furiously</u>.
o(o″) σ(j″)

(77.2) Bo(o″) Jσ(j″)

(78.0) <u>Our home</u> <u>faces</u> <u>the beach</u>.
$\ell_1(h'')$ $\ell_2(\ell'')$

(78.1) Z$\ell_1(h'')$D$\ell_2(\ell'')$

(79.0) Our house **is far away from** the beach.
r(ℓ″) ℓ(ℓ″)

(79.1) Zr(ℓ″)Rℓ(ℓ″)

(80.0) The man **went to** the beach **with** his wife.
h_1(v″) ℓ(ℓ″) h_2(v″)

(80.1) [Bh_1(v″) Gℓ(ℓ″)] Jh_2(v″)

(81.0) The man **causes** his son **to leave** the room.
h_1(v″) h_2(v″) ℓ(ℓ″)

(81.1) Ch_1(h″) E[Bh_2(v″) Sℓ(ℓ″)]

(82.0) Uganda **is part of** East Africa.
$ℓ_1$(ℓ″) [ZP] $ℓ_2$(ℓ″)

(82.1) Z$ℓ_1$(ℓ″) P$ℓ_2$(ℓ″)

(83.0) 7 is greater than 6.
n_1(n″) n_2(n″)

(83.1) Zn_1(n″)Un_2(n″)

(84.0) 6 **is less than** 7.
n_1(n″) n_2(n″)

(84.1) Zn_1(n″)Ln_2(n″)

(85.0) The delegates **were standing outside** the conference hall.
h(v″) [ZX] ℓ(h″)

(85.1) Zh(v″)Xℓ(h″)

Having formalized the 85 situations, I wish now to make the following explanatory observations for the reader's consideration:

(1) In a situation two or more arguments may belong to the same type but be in different domains, cf. situations (11), (33), (41),(49),(51),(62),and (75).

(2) Preceding canonization may be necessary so that the subject in the sentence is both logical and grammatical, cf.(36), (49), and (61).

(3) Preceding paraphrasing of light-verb constructions may be necessary, cf.(37),(39), and (50).

(4) A predicate may be reduced as in (23) [Φ], (39) and (52)N as opposed to [ΦE], and [NA].

(5) In a predicate a semantic role may be optional as in (37), (62), (73), and (80).

(6) For justification of the anticauser K, cf. (30), (31), and (33).

(7) On the basis of the predicate types [Σ],[Σχ], [ΨA], and [ΦE], further predicate types are generable as the following limited range illustrates:

[Σ]	Σχ[Σ]	ΨA[Σ]	ΦE[Σ]
[Σχ]	Σχ[Σχ]	ΨA[Σχ]	ΦE[Σχ]
[ΨA]	Σχ[ΨA]	ΨA[ΨA]	ΦE[ΨA]
[ΦE]	Σχ[ΦE]	ΨA[ΦE]	ΦE[ΦE]
			ΦE[ΦE[Σ]]
			ΦE[ΦE[Σχ]]
			ΦE[ΦE[ΨA]]
			ΦE[ΦE[ΦE]]

Proficiency in formalizing situations is a prerequisite for understanding semantic equations, to which I now turn. Consider a situation of donation in (86) and the relevant semantic equation in (87).

(86.0) An anonymous philanthropist **donated** twenty million US
h(h″) CE[NA] r(f″)

dollars **to** Muteesa University.
a(ℓ″,h″)

(87.0) $Ch(h'')E[Na(\ell''h'')Ar(f'')] = \sigma = Ch(\sigma'') + Na(\sigma'') + Ar(\sigma'')$

The semantic reaction in (87) results in Ch(σ ″) (the donor), Na(σ ″) (the donee), and Ar(σ ″) (the donation). In (88) –(91) I generalize some semantic equations.

(88.0) $\Phi\eta_1(\delta_1)E[\Sigma\eta_2(\delta_2)] = \Phi\eta_{1(}\sigma'') + \Sigma\eta_2(\sigma'')$

(89.0) $\Phi\eta_1(\delta_1)E[\Sigma\eta_2(\delta_2)\chi\eta_3(\delta_3)] = \Phi\eta_{1(}\sigma'') + \Sigma\eta_2(\sigma'')+\chi\eta_3(\sigma'')$

(90.0) $\Phi\eta_1(\delta_1)E[\psi\eta_2(\delta_2)A\eta_3(\delta_3)] = \Phi\eta_{1(}\sigma'') + \psi\eta_2(\sigma'')+A\eta_3(\sigma'')$

(91.0) $\Phi\eta_1(\delta_1)E[\Phi\eta_2(\delta_2)]\ E[\Sigma\eta_3(\delta_3)]] = \Phi\eta_{1(}\sigma'') + \Phi\eta_2(\sigma'')+\Sigma\eta_3(\sigma'')$

6. FROM NEWTONIAN FORCES TO PREDICATION?

In Section 4 it was axiomatized that linguistic signification at least parallels motion which is caused by Newtonian forces. I assume that in most languages signification involves predication. The adjoining table presents data on the relationship that obtains between Newton's Laws of Motion and predicate patterns. Via the semanticosyntactic isomorphism (assumed for most languages) the predicate patterns are exemplified by means of verbs and adjectives. <SV>, <SVX>, $<SVO^1>$, $<SVO^2>$, <SVOX>, and (SVOO> are the basic syntactic function patterns exemplified in the table, where S,V,X,O stand for subject, verb (predicate), non-object and object respectively. It will be noted that

$<SVO^1> \cong [\psi A]$ while $<SVO^2> \cong \Phi E[\Sigma]$.

Table: Motion and Predication

F = m$\mathbf{a}$ = 0 [Newton I]	[Z] ≅ <SV>	to rest, open, wide, to stand, to sleep
	[B] ≅ <SV>	to die, to fall, to leave, to rise, to grow, to disappear, to open. to widen
	[Zχ] ≅ <SVX>	to keep fresh, to look, to taste, to remain, to weigh, to be, to seem, to smell, to stay, to feel, to measure, to cost
	[Bχ] ≅ <SVX>	to become, to grow, to get, to leave, to run, to fall, to go, to turn, to shift, to walk
F_{12} + F_{21} = m$\mathbf{a}$ = 0 [Newton III]	[TA] ≅ <SVO^1>	to know, to love, to believe, to touch
	[NA] ≅ <SVO^1>	to kiss, to see, to smell, to kick, to touch, to knock to hear, to hit, to take, to task, to press , to learn, to paint
F = m$\mathbf{a}$ ≠ 0 [Newton II]	KE[Z] ≅ <SVO^2>	to rest sth, to stunt sth, , to retard sth, to prop, to support
	CE[B] ≅ <SVO^2>	to kill , to ruin, to dig , to write , to invent , to widen , to destroy, to open , to fell , to open , to frighten , to build, to drop , to raise , to paint , to burn
	KE[Zχ] ≅ <SVOX>	to keep sth fresh , to hold back , to detain , to confine , to restrict
	CE[Bχ] ≅ <SVOX>	to get , to take, to elect , to place , to put , to turn , to shift, to infer from
F_{12} + F_{21} = m$\mathbf{a}$ ≠ 0 [Newton II]	KE[TA] ≅ <SVOO>	to hold up, to keep
	CE[NA] ≅ <SVOO>	to give, to inform , to show ,to teach

In Section 5 static predicate patterns were exemplified thus: [Z] (24) ;
[ZR] (19), 22, 79 ; [TA] (32), (34), (64) ; KE[Z] (30). Let me focus my attention on the patterns KE [ZR] and KE[TA] for further exemplification .

(1) The magnet **holds up** an iron ball **in** the air.
$r_1(m'')$ $r_2(m'')$ $\ell(\ell'')$

(1′) $Kr_1(m'')\ E[\ Zr_2(m'')R\ell(\ell'')]$

(2) A wedge **prevents** the cart **from sliding down** the incline.
$r_1(m'')$ KE[TA] $r_2(m'')$ $r_3(m'')$

(2′) $Kr_1(m'')\ E[\ Tr_2(m'')Ar_3(m'')]$

(3) The police **detained** a suspect **in** the cell.
$a(v'',h'')$ $h(h'')$ $r(\ell'')$

(3′) $Ka(v'',h'')E[\ Zh(h'')Rr(\ell'')]$

How could the relationship between motion and predication be characterized? May the reader ruminate on the following argument:

(1) Newtonian forces cause physical bodies to move. [Newton I, II, III]
(2) The mind signifies linguistically. [Assumption]
(3) Linguistic signification parallels physical motion. [Axiom 1, Table]
<2,3 > (4) Therefore, the mind simulates physical motion.
<1,4 > (5) Therefore, Newtonian forces cause the mind to signify linguistically.

Should the above argument be upheld, then we would hold that language obeys Newton's Laws of Motion.

7. CONCLUSION

In this paper I set out to offer an answer to the bifurcate question: How are semantic roles to be determined; and how many are there? My answer does not merely seem to be but, in fact, is principled. First, there are EXACTLY FOUR predicate types ([Σ], [Σχ], [ΨA], and [ΦE]) intriguingly analogous to the EXACTLY FOUR forms of Newtonian motion (absolute, relative, contactive, and causative). Second, there are EXACTLY NINE semantic role types , namely, B,Z,R, N, T, A, C, K, and E. If one is working on Luganda, one can recognize D, J, S, M, G, W, O, Y, X, P, U, I and L as sub-role types of R.

I conclude this paper by preempting plausible objections to my theory. First, it may at times be difficult to distinguish between change roles (B, N, C) and non-change ones (Z, T, K). It is notable that $\mathbf{a} = \mathbf{0}$ with $\mathbf{v} = \mathbf{0}$ is mechanically and clear-cut differentiable from $\mathbf{a} \neq \mathbf{0}$. I only wish the linguist were not in a situation similar to that of a chemist who not only handles acidic and basic substances but also amphoteric ones. Second, the significance of the present theory lies in the facilitation of cross-linguistic analysis. Lastly, I make no claim to SWEEPING universality of my theory because I am fully mindful of possible caveats from pidgins, creoles and optolanguages.

References

Brown, Keith and Jim Miller (1991) *Syntax: A Linguistic Introduction to Sentence Structure*, 2nd edn, London and New York: Routledge.

Fromkin, Victoria, Robert Rodman and Nina Hyams (2003) *An Introduction to Language*, 7th edn; Boston, Massachusetts: Wadsworth Thomson.

Huddleston, Rodney and Geoffrey K. Pullum (2002) *The Cambridge Grammar of the English Language*, Cambridge: Cambridge University Press

Larson, Richard and Gabriel Segal (1995) *Knowledge of Meaning*; Cambridge, MA: MIT Press.

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