FROM NEWTON'S LAWS OF MOTION TO NATURAL LANGUAGE AND A PERIODIC TABLE OF CONCEPTUAL ELEMENTS

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Sec 1 **Notational Conventions**

Throughout this paper the following notational conventions should be noted.

Sec 1.1 Newtonian Mechanics

F	force
m	mass
a	acceleration
$\mathbf{F}_{1\to2}$	force exerted by body 1 on body 2
$\mathbf{F}_{2\to1}$	force exerted by body 2 on body 1

Sec 1.2 Conceptual Predicates and Objects

B	change-bearer	Z	non-change-bearer
R	reference	C	dynamic causer
K	static causer	E	effected
N	dynamic contactor	T	static contactor
A	contacted	Σ	B/Z
Φ	C/K	Ψ	N/T

y, y_1, y_2, y_3 conceptual objects

Sec 1.3 Functional Sentences Constituents

S	subject	V	verb
C	complement	Adl	adverbial
O	object		

Sec 1.4 Formal Sentence Constituents

N"	noun phrase	Vg	verb group
A"	adjective phrase	S'	subordinate clause
Adv"	adverb phrase	P"	prepositional phrase

Sec 1.5 Symbols

:	"realizes"
< >	order brackets
[ ]	block brackets

{ } choice brackets

≅ "is isomorphic with"

=df "is defined as"

Sec 2 **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 lingustics. 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 amd 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 elaboration of atomic theory by 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 the atomic theory was tortuous; but we 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. Taking my cue from Larson and Segal, I embark on the quest for semantic roles, in relevant areas beyond linguistics with extraordinary keenness on Newtonian mechanics.

Sec 3 **Newton's Laws of Motion**

Newton's First Law of Motion states that if the resultant external force acting on a particle is zero, then it will either remain at rest (if is already at rest) or it will move at a constant speed in a straight line (if it is already in motion).

Newton's Second Law of Motion states that if the resultant external force acting on a particle in non-zero, then it will move with an acceleration proportional to the mass of the particle and in the direction of the force.

Newton's Third Law of Motion states that if two particles are in contact, then the force exerted on particle 2 by particle 1 is equal and opposite to the force exerted on particle1 by particle 2.

Newton I, $\mathbf{F} = m\mathbf{a} = 0$, is concerned with change of particles in space-time. Newton II, $\mathbf{F} = m\mathbf{a} \neq 0$, is concerned with causation of the change of particles in space-time. Newton III, $\mathbf{F}_{1\rightarrow2} = -\mathbf{F}_{2\rightarrow1}$, is concerned with contact between the changing particles in space-time.

Sec 4 **Thesis**

There exists a link between the motion of particles in space-time and the conceptual reactions in the human brain such that

Newton I [$\mathbf{F} = m\mathbf{a} = 0$]: $y_1\Sigma y_2R$, where $\Sigma = B/Z$, and where B = change-bearer, Z = non-change bearer, R = reference;

Newton II [$\mathbf{F} = m\mathbf{a} \neq 0$]: $y_1\Phi y_2E$, where $\Phi = C/K$, and where C = dynamic causer, K = static causer, E = effected;

Newton III [$\mathbf{F}_{1\rightarrow2} = -\mathbf{F}_{2\rightarrow1}$] $y_1\Psi y_2A$, where $\Psi = N/T$, and where N = dynamic contactor, T = static contactor, A = contacted.

Sec 5 **Definitions**

If y and π are a conceptual object and predicate respectively, then

(1) $y\pi$ is a conceptual element

(2) $y_1\pi_1y_2\pi_2$ is a conceptual reaction

(3) $y_1\pi_1y_2\pi_2 = y_1\pi_1\pi_2 + \pi_1y_2\pi_2$ is a conceptual equation

(4) $\pi_1\pi_2$ is a compound predicate

(5) $<y_1\pi_1\pi_2 \quad [\pi_1\pi_2] \quad \pi_1y_2\pi_2>$ is a conceptual sequence

Sec 6 **English Sentence Patterns**

Every English sentence is reducible to a pattern from the following hierarchy:

(1) < S V >

(2) < S V C >

(3) < S V Adl >

(4) < S V O >

(5) < S V O C >

(6) < S V O Adl >

(7) < S V O O

Sec 7 **Classification of Human Languages**

To all intents and purposes a language attests to one of the following six sentence patterns:
< S V O >, < S O V >, < V S O >, < V O S >, < O S V >, < O V S >

Sec 8 **The Conceptual-Linguistic Interface**

(1) [**F** = m**a** = 0]: [yΣ = yΣ] < yΣ Σ > ≅ < S V > ≅ < N" Vg >

(2) [**F** = m**a** = 0]: [yΣ = yΣ] < yΣ Σ > ≅ < S V C > ≅ < $N"_1$ Vg $N"_2$/A"/S' >

(3) [**F** = m**a** = 0]: [$y_1Σy_2R$ = [$y_1ΣR$ + $Σy_2R$]]

< $y_1ΣR$ [ΣR] $Σy_2R$ > ≅ < S V Adl > ≅ < $N"_1$ Vg $N"_2$/Adv"/S'/P" >

(4i) $\begin{pmatrix} \mathbf{F} = m\mathbf{a} \neq 0 \\ \mathbf{F} = m\mathbf{a} = 0 \end{pmatrix}$: [$y_1Φ[y_2Σ]E$ = [$y_1Φ[Σ]E$ + $Φ[y_2Σ]E$]]

< $y_1Φ[Σ]E$ $Φ[Σ]E$ $Φ[y_2Σ]E$ > ≅ < S V O > ≅ < $N"_1$ Vg N"/S'/P" >

(4ii) [$\mathbf{F}_{1\to2}$ = -$\mathbf{F}_{2\to1}$]: [$y_1Ψy_2A$ = [$y_1ΨA$ + $Ψy_2A$]]

< $y_1ΨA$ [ΨA] $Ψy_2A$ > ≅ < S V O > ≅ < $N"_1$ Vg $N"_2$/S'/P" >

(5) $\begin{pmatrix} \mathbf{F} = m\mathbf{a} \neq 0 \\ \mathbf{F} = m\mathbf{a} = 0 \end{pmatrix}$: [$y_1Φ[y_2Σ]E$ = [$y_1Φ[Σ]E$ + $Φ[y_2Σ]E$]]

< $y_1Φ[Σ]E$ $Φ[Σ]E$ $Φ[y_2Σ]E$ > ≅ < S V O C > ≅ < $N"_1$ Vg $N"_2$ $N"_3$/A"/S' >

(6) $\left(\begin{array}{l}\mathbf{F} = m\mathbf{a} \neq 0 \\ \mathbf{F} = m\mathbf{a} = 0\end{array}\right)$: $[y_1\Phi[y_2\Sigma y_3R]E = [y_1\Phi[\Sigma R]E + \Phi[y_2\Sigma R]E + \Phi[\Sigma y_3R]E]]$

$< y_1\Phi[\Sigma R]E \quad \Phi[\Sigma R]E \quad \Phi[y_2\Sigma R]E \quad \Phi[\Sigma y_3R]E > \tilde{=} < \underline{S} \ \underline{V} \ \underline{O} \ \underline{Adl} >$

$\tilde{=} < N''_1 \ Vg + N''_2 \ N''_3/Adv''/S'/P'' >$

(7i) $\left(\begin{array}{l}\mathbf{F} = m\mathbf{a} \neq 0 \\ \mathbf{F} = m\mathbf{a} = 0\end{array}\right)$: $[y_1\Phi[y_2\Phi[y_3\Sigma]E]E = [y_1\Phi[\Phi[\Sigma]E]E + \Phi[y_2\Phi[\Sigma]E]E + \Phi[\Phi[y_3\Sigma]E]E]$

$< y_1\Phi[\Phi[\Sigma]E]E \quad \Phi[\Phi[\Sigma]E]E \quad \Phi[y_2\Phi[\Sigma]E]E \quad \Phi[\Phi[y_3\Sigma]E]E > \tilde{=} < \underline{S} \ \underline{V} \ \underline{O} \ \underline{O} >$

$\tilde{=} < N''_1 \ Vg \ N''_2 \ N''_3/S'/P'' >$

(7ii) $\left(\begin{array}{l}\mathbf{F} = m\mathbf{a} \neq 0 \\ \mathbf{F}_{1\rightarrow 2} = -\mathbf{F}_{2\rightarrow 1}\end{array}\right)$: $[y_1\Phi[y_2\Phi\Psi y_3A]E = [y_1\Phi[\Psi A]E + \Phi[y_2\Psi A]E + \Phi[\Psi y_3A]E]]$

$< y_1\Phi[\Psi A]E \quad \Phi[\Psi A]E \quad \Phi[y_2\Psi A]E \quad \Phi[\Psi y_3A]E > \tilde{=} < \underline{S} \ \underline{V} \ \underline{O} \ \underline{O} >$

$\tilde{=} < N''_1 \ Vg \ N'' \ N''_3/S'/P'' >$

Sec 9 **The Nine Semantic Role Types**

Since (1) isomorphism obtains at the conceptual-linguistic interface,

(2) | (7ii) | (7i) | (6) | (5) | in Sec 8 is reducible to | (4ii) | (4i) | (3) | (2) | ,

(3) the conceptual predicates in Sec 8 are generalized semantic role types,

and (4) sentences of the patterns in Sec 7 are intertranslatable,

there are nine and only nine semantic role types, namely **change-bearer** [B]**, non-change bearer** [Z]**, reference** [R]; **dynamic causer** [C]**, static causer** [K]**, effected** [E]; **dynamic contactor** [N]**, static contactor** [T]**,** and **contacted** [A]**.**

Let them be defined.

Using (1) Newton I, $\{[B], [Z], [R]\} =_{df} [\mathbf{F} = m\mathbf{a} = 0]: [y_1\Sigma y_2R = y_1\Sigma R + \Sigma y_2R]$

(2) Newton II, $\{[C], [K], [E]\} =_{df} [\mathbf{F} = m\mathbf{a} \neq 0]: [y_1\Phi y_2E = y_1\Phi E + \Phi y_2E]$

(3) Newton III, $\{[N], [T], [A]\} =_{df} [\mathbf{F}_{1\rightarrow 2} = -\mathbf{F}_{2\rightarrow 1}]: [y_1\Psi y_2A = y_1\Psi A + \Psi y_2A]$

Sec 10 **A Tentative Periodic Table of Conceptual Elements**

In Sec 5 the conceptual element is defined as yπ, where y and π are a conceptual object and predicate respectively. We now turn to a system that interrelates π, y and yπ by presenting a tentative periodic table of conceptual elements in which vertical columns are groups that accord with the nine predicate types in Sec 9; and in which horizontal rows represent eighty-one conceptual periods. The table comprises 729 conceptual elements.

We may discern the following superperiods:

(1) Situation si – Mapping ma

(2) Space l – Degree g

(3) Matter m – Particle pt

(4) Time t – Charge ch

(5) Non-life Object r – Post-life Object p

(6) Mind mi – Valuer x

(7) Sign sg – Affective af

(8) Institution i – Supernatural su

THE PERIODIC TABLE OF CONCEPTUAL ELEMENTS

	Change Bearer B	Nonchange Bearer Z	Reference R	Dynamic Causer C	Static Causer K	Effected E	Dynamic Contactor N	Static Contactor T	Contacted A
Situation si	1 siB	2 siZ	3 siR	4 siC	5 siK	6 siE	7 siN	8 siT	9 siA
Process pc	10 pcB	11 pcZ	12 pcR	13 pcC	14 pcK	15 pcE	16 pcN	17 pcT	18 pcA
Event ee	19 eeB	20 eeZ	21 eeR	22 eeC	23 eeK	24 eeE	25 eeN	26 eeT	27 eeA
State sa	28 saB	29 saZ	30 saR	31 saC	32 saK	33 saE	34 saN	35 saT	36 saA
Quality ql	37 qlB	38 qlZ	39 qlR	40 qlC	41 qlK	42 qlE	43 qlN	44 qlT	45 qlA
Quantity q	46 qB	47 qZ	48 qR	49 qC	50 qK	51 qE	52 qN	53 qT	54 qA
Unit u	55 uB	56 uZ	57 uR	58 uC	59 uK	60 uE	61 uN	62 uT	63 uA
Set s	64 sB	65 sZ	66 sR	67 sC	68 sK	69 sE	70 sN	71 sT	72 sA
Whole wh	73 whB	74 whZ	75 whR	76 whC	77 whK	78 whE	79 whN	80 whT	81 whA
Part pa	82 paB	83 paZ	84 paR	85 paC	86 paK	87 paE	88 paN	89 paT	90 paA
System sy	91 syB	92 syZ	93 syR	94 syC	95 syK	96 syE	97 syN	98 syT	99 syA
Number n	100 nB	101 nZ	102 nR	103 nC	104 nK	105 nE	106 nN	107 nT	108 nA
Variable va	109 vaB	110 vaZ	111 vaR	112 vaC	113 vaK	114 vaE	115 vaN	116 vaT	117 vaA
Constant co	118 coB	119 coZ	120 coR	121 coC	122 coK	123 coE	124 coN	125 coT	126 coA
Mapping ma	127 maB	128 maZ	129 maR	130 maC	131 maK	132 maE	133 maN	134 maT	135 maA
Space l	136 lB	137 lZ	138 lR	139 lC	140 lK	141 lE	142 lN	143 lT	144 lA
Distance ds	145 dsB	146 dsZ	147 dsR	148 dsC	149 dsK	150 dsE	151 dsN	152 dsT	153 dsA
Place pl	154 plB	155 plZ	156 plR	157 plC	158 plK	159 plE	160 plN	161 plT	162 plA
Point po	163 poB	164 poZ	165 poR	166 poC	167 poK	168 poE	169 poN	170 poT	171 poA
Angle a	172 aB	173 aZ	174 aR	175 aC	176 aK	177 aE	178 aN	179 aT	180 aA
Form fo	181 foB	182 foZ	183 foR	184 foC	185 foK	186 foE	187 foN	188 foT	189 foA
Shape sh	190 shB	191 shZ	192 shR	193 shC	194 shK	195 shE	196 shN	197 shT	198 shA
Ordered o	199 oB	200 oZ	201 oR	202 oC	203 oK	204 oE	205 oN	206 oT	207 oA
First fs	208 fsB	209 fsZ	210 fsR	211 fsC	212 fsK	213 fsE	214 fsN	215 fsT	216 fsA
Between bt	217 btB	218 btZ	219 btR	220 btC	221 btK	222 btE	223 btN	224 btT	225 btA
Last la	226 laB	227 laZ	228 laR	229 laC	230 laK	231 laE	232 laN	233 laT	234 laA
Direction d	235 dB	236 dZ	237 dR	238 dC	239 dK	240 dE	241 dN	242 dT	243 dA
Degree g	244 gB	245 gZ	246 gR	247 gC	248 gK	249 gE	250 gN	251 gT	252 gA

Matter m	253 mB	254 mZ	255 mR	256 mC	257 mK	258 mE	259 mN	260 mT	261 mA
Body bo	262 boB	263 boZ	264 boR	265 boC	266 boK	267 boE	268 boN	269 boT	270 boA
Model mo	271 moB	272 moZ	273 moR	274 moC	275 moK	276 moE	277 moN	278 moT	279 moA
Solid sl	280 slB	281 slZ	282 slR	283 slC	284 slK	285 slE	286 slN	287 slT	288 slA
Liquid lq	289 lqB	290 lqZ	291 lqR	292 lqC	293 lqK	294 lqE	295 lqN	296 lqT	297 lqA
Gas ga	298 gaB	299 gaZ	300 gaR	301 gaC	302 gaK	303 gaE	304 gaN	305 gaGA	306 gaA
Plasma ps	307 psB	308 psZ	309 psR	310 psC	311 psK	312 psE	313 psN	314 psT	315 psA
Particle pt	316 ptB	317 ptZ	318 ptR	319 ptC	320 ptK	321 ptE	322 ptN	323 ptT	324 ptA
Time t	325 tB	326 tZ	327 tR	328 tC	329 tK	330 tE	331 tN	332 tT	333 tA
Duration du	334 duB	335 duZ	336 duR	337 duC	338 duDU	339 duE	340 duN	341 duT	342 duA
Instant in	343 inB	344 inZ	345 inR	346 inC	347 inK	348 inE	349 inN	350 inT	351 inA
Frequency fr	352 frB	353 frZ	354 frR	355 frC	356 frK	357 frFR	358 frN	359 frT	360 frA
Force k	361 kB	362 kZ	363 kR	364 kC	365 kK	366 kE	367 kN	368 kT	369 kA
Field fi	370 fiB	371 fiZ	372 fiR	373 fiC	374 fiK	375 fiE	376 fiN	377 fiT	378 fiA
Energy e	379 eB	380 eZ	381 eR	382 eC	383 eK	384 eE	385 eN	386 eT	387 eA
Wave wa	388 waB	389 waZ	390 waR	391 waC	392 waK	393 waE	394 waN	395 waT	396 waA
Taste ta	397 taB	398 taZ	399 taR	400 taC	401 taK	402 taE	403 taN	404 taT	405 taA
Smell sm	406 smB	407 smZ	408 smR	409 smC	410 smK	411 smE	412 smN	413 smT	414 smA
Sound so	415 soB	416 soZ	417 soR	418 soC	419 soK	420 soE	421 soN	422 soT	423 soA
Heat he	424 heB	425 heZ	426 heR	427 heC	428 heK	429 heE	430 heN	431 heT	432 heA
Light li	433 liB	434 liZ	435 liR	436 liC	437 liK	438 liE	439 liN	440 liT	441 liA
Charge ch	442 chB	443 chZ	444 chR	445 chC	446 chK	447 chE	448 chN	449 chT	450 chA
Non-life Object r	451 rB	452 rR	453 rR	454 rC	455 rK	456 rE	457 rN	458 rT	459 rA
Life Object b	460 bB	461 bZ	462 bR	463 bC	464 bK	465 bE	466 bN	467 bT	468 bA
Plant f	469 fB	470 fZ	471 fR	472 fC	473 fK	474 fE	475 fN	476 fT	477 fA
Animal z	478 zB	479 zZ	480 zR	481 zC	482 zK	483 zE	484 zN	485 zT	486 zA
Human h	487 hB	488 hZ	489 hR	490 hC	491 hK	492 hE	493 hN	494 hT	495 hA
Mind mi	496 miB	497 miZ	498 miR	499 miMI	500 miK	501 miE	502 miN	503 miT	504 miA
Biophysical Willer v	505 vB	506 vZ	507 vR	508 vC	509 vK	510 vE	511 vN	512 vT	513 vA
Perceiver w	514 wB	515 wZ	516 wR	517 wC	518 wK	519 wE	520 wN	521 wT	522 wA
Cogitator c	523 cB	524 cZ	525 cR	526 cC	527 cK	528 cE	529 cN	530 cT	531 cA
Valuer x	532 xB	533 xZ	534 xR	535 xC	536 xK	537 xE	538 xN	539 xT	540 xA

Post-life Object p	541 pB	542 pZ	543 pR	544 pC	545 pK	546 pE	547 pN	548 pT	549 pA
Sign sg	550 sgB	551 sgZ	552 sgR	553 sgC	554 sgK	555 sgE	556 sgN	557 sgT	558 sgA
Sentence se	559 seB	560 seZ	561 seR	562 seC	563 seK	564 seE	565 seN	566 seT	567 seA
Mode md	568 mdB	569 mdZ	570 mdR	571 mdC	572 mdK	573 mdE	574 mdN	575 mdT	576 mdA
Truth tr	577 trB	578 trZ	579 trR	580 trC	581 trK	582 trE	583 trN	584 trT	585 trA
Probability pr	586 prB	587 prZ	588 prR	589 prC	590 prK	591 prE	592 prN	593 prT	594 prA
Falsehood fa	595 faB	596 faZ	597 faR	598 faC	599 faK	600 faE	601 faN	602 faT	603 faA
Belief be	604 beB	605 beZ	606 beR	607 beC	608 beK	609 beE	610 beN	611 beT	612 beA
Evidence ev	613 evB	614 evZ	615 evR	616 evC	617 evK	618 evE	619 evN	620 evT	621 evA
Knowledge no	622 noB	623 noZ	624 noR	625 noC	626 noK	627 noE	628 noN	629 noT	630 noA
Statement st	631 stB	632 stZ	633 stR	634 stC	635 stK	636 stE	637 stN	638 stT	639 stA
Question qs	640 qsB	641 qsZ	642 qsR	643 qsC	644 qsK	645 qsE	646 qsN	646 qsT	648 qsA
Directive dr	649 drB	650 drZ	651 drR	652 drC	653 drK	654 drE	655 drN	656 drT	657 drA
Exclamation ex	658 exB	659 exZ	660 exR	661 exC	662 exK	663 exE	664 exN	665 exT	666 exA
Representative re	667 reB	668 reZ	669 reR	670 reC	671 reK	672 reE	673 reN	674 reT	675 reA
Informative if	676 ifB	677 ifZ	678 ifR	679 ifC	680 ifK	681 ifE	682 ifN	683 ifT	684 ifA
Commissive cm	685 cmB	686 cmZ	687 cmR	688 cmC	689 cmK	690 cmE	691 cmN	692 cmT	693 cmA
Expressive ep	694 epB	695 epZ	696 epR	697 epC	698 epK	699 epE	700 epN	701 epT	702 epA
Affective af	703 afB	704 afZ	705 afR	706 afC	707 afK	708 afE	709 afN	710 afT	711 afA
Institution i	712 iB	713 iZ	714 iR	715 iC	716 iK	717 iE	718 iN	719 iT	720 iA
Supernatural su	721 suB	722 suZ	723 suR	724 suC	725 suK	726 suE	727 suN	728 suT	729 suA

Sec 11 **Formalization of Conceptual Meaning: Examples**

(1i) <u>The door</u> was opening.

(1ii) rB = rB

(2i) <u>The door</u> was open.

(2ii) rZ = rZ

(3i) <u>The child</u> opened <u>the door</u>.
1 2

(3ii) $h_1(v)C[r_2B]E = h_1(v)C[B]E + C[r_2B]E$

(4i) <u>The key</u> opened <u>the door</u>.
1 2

(4ii) $r_1C[r_2B]E = r_1C[B]E + C[r_2B]E$

(5i) The child$_1$ opened the door$_3$ with the key$_2$.

(5ii) $h_1(v)C[r_1C[r_3B]E]E = h_1(v)C[C[B]E]E + C[r_2C[B]E]E + C[C[r_3B]E]E$

(6i) The old man$_1$ was in the room$_2$.

(6ii) $h_1Zpl_2R = h_1ZR + Zpl_2R$

(7i) The Internal Security Organization$_1$ detained the old man$_2$ in the room$_3$.

(7ii) $i_1K[h_2Zpl_3R]E = i_1K[ZR]E + K[h_2ZR]E + K[Zpl_3R]E$

(8i) The pupil$_1$ saw the book$_2$.

(8ii) $h_1(w)Nr_2(sg)A = h_1(w)NA + Nr_2(sg)A$

(9i) The candidate$_1$ knew the answer$_2$.

(9ii) $h_1(c)Tst_2A = h_1(c)TA + Tst_2A$

Sec 12 **Problems Ensuing from this Paper**

We conclude this paper by identifying three related problems that must be tackled. First, the periodic table in Sec 10 is to be elaborated so as to determine what conceptual periods ultimately there are. Can the ascending conceptual number be motivated and justified in some principled way? Second, if we assume that the meaning of a sentence has three components, namely conceptual, grammatical, and discoursal, then we are occasioned to ask the question: Is discoursal meaning formalizable? Third, can we formulate an overall theory of translation?

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