Classification of Wordnet Personality Adjectives in the NEO PI-R Taxonomy

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{abandoned, abashed, aberrant, abhorrent, abiding, abject, able, abnormal, abrasive, abrupt, absent-minded, absorbed, absurd, abusive, accepting, accomplished, acid, active, adamant, adaptable, addicted, adorable, adventurous, affective, afraid, aggressive, agonizing, agreeable, alcoholic, alert, alive, all-around, alluring, aloof, ambiguous, ambitious, amoral, amused, amusing, anal-retentive, ancient, angry, animated, annoyed, annoying, anxious, apathetic, appealing, appreciated, argumentative, arrogant, articulate, artificial, artistic, ashamed, assertive, astonishing, athletic, attentive, auspicious, automatic, awake, aware, awesome, awful, awkward, bad, bad-humored, bad-tempered, balanced, barbarous, bashful, beautiful, belligerent, bent, berserk, better, bewildered, biased, big, big-headed, bigoted, bitchy, bitter, bizarre, black, blue, blunt, boastful, bodacious, boiling, bold, boorish, bored, boring, bossy, boundless, bovine, brainy, brash, brat, brave, breakable, breezy, brief, bright, brilliant, broad, broken, burly, busy, cagey, callous, calm, cantankerous, capable, capricious, carefree, careful, careless, caring, casual, casual, cautious, certain, certainly, changeable, chaotic, charming, chatty, cheap, cheeky, cheerful, cheery, childish, childlike, chivalrous, chunky, classy, clean, clear, clever, clueless, clumsy, coarse, coherent, cold, colossal, combative, comfortable, comforting, common, compassionate, competent, complex, complicated, conceited, concerned, confident, confused, conscientious, conservative, considerate, consistent, content, conventional, cool, cooperative, correct, courageous, courteous, cowardly, crabby, crazy, creative, credible, creepy, critical, crooked, cross, cruel, cultured, curious, cute, cynical, daffy, dainty, dangerous, daring, dark, dashing, dazzling, dead, dear, debonair, deceitful, deceiving, decent, decisive, decorous, dedicated, deep, defeated, defective, defiant, delicate, delightful, demanding, demented, demonic, dependable, dependant, depressed, depressive, deranged, deserted, desperate, despised, detailed, detail-oriented, determined, detestable, devilish, devoted, devout, didactic, different, difficult, diligent, dirty, disagreeable, discreet, disgruntled, disgusting, dishonest, disillusioned, disloyal, disobedient, disorganized, distasteful, distinctive, disturbed, dizzy, dogged, dogmatic, domineering, dopey, doubtful, dowdy, dramatic, dreary, dull, dumb, dutiful, dynamic, eager, earthy, easy-going, ebullient, eccentric, educated, efficacious, efficient, egotistical, elated, elderly, elegant, embarrassed, eminent, emphatic, enchanting, encouraging, endurable, energetic, engaging, enlightened, enterprising, entertaining, enthusiastic, enthusiastic, envious, equable, erect, erratic, ethereal, ethical, evanescent, evasive, evil, excellent, excitable, excited, exclusive, exotic, expansive, expectant, expensive, expert, expressive, extroverted, exuberant, exultant, fabulous, facetious, faded, fainthearted, fair, faithful, famous, fanatical, fancy, fantastic, fascinated, fascinating, fashionable, fast, fat, faulty, fawning, feared, fearless, feeble, feeling, feminine, ferocious, fervent, fierce, filthy, fine, finicky, fit, fixed, flashy, flighty, flippant, flipped-out, flirtatious, flitting, foolhardy, foolish, forgetful, forgiving, forthright, fortunate, forward, fragile, frantic, free, fretful, friendly, frightened, frightening, frustrating, funny, furtive, fuzzy, gaping, garrulous, generous, genial, genius, gentle, genuine, giant, giddy, gifted, gigantic, giving, glamorous, glib, godly, good, good-humored, gorgeous, graceful, gracious, grandiose, grateful, great, greedy, green, grieving, groovy, grotesque, grouchy, gruesome, grumpy, guarded, guiltless, gullible, guts, guttural, habitual, half, handsome, hapless, happy, hard, hard-headed, hardheaded, hard-working, hardworking, harmful, harmless, harmonious, hasty, haughty, healthy, heartbreaking, hearted, heartless, hearty, heavenly, heavy, hellish, helpful, helpless, hesitant, high, high-spirited, hilarious, hollow, homeless, home-loving, honest, honorable, hopeful, horrible, hospitable, hostile, huge, humble, humorous, hungry, hurried, hurt, hysterical, idealistic, idiotic, ignorant, ill, ill-humored, ill-tempered, illustrious, imaginative, immature, immense, immoral, impartial, imperfect, important, impossible, impulsive, incompetent, inconsiderate, independent, indifferent, indiscreet, indulgent, industrious, inexpensive, inflexible, informed, innocent, inquisitive, insane, instinctive, intellectual, intelligent, intense, interested, interested-in, interesting, intolerant, introverted, intuitive, inventive, investigative, invincible, involved, irascible, irate, irresistible, irresolute, irresponsible, irritated, irritating, isolated, itchy, jealous, jittery, jolly, joyful, joyous, judgmental, jumpy, just, juvenile, kaput, keen, kind, kind-hearted, kindhearted, know-all, knowing, knowledgeable, known, lacking, laid-back, lamentable, languid, large, late, lavish, lazy, leader, lean, learned, lethargic, level, liberal, light, light-hearted, likable, likeable, literate, little, lively, logical, lonely, lonesome, long, longing, loopy, lopsided, loud, lovable, lovely, loving, low, lowly, loyal, lucky, ludicrous, lush, luxuriant, lyrical, macabre, macho, mad, maddening, magical, magnanimous, magnificent, majestic, malicious, mammoth, maniacal, manipulative, massive, matchless, materialistic, mature, mean, mean-spirited, meek, melancholy, melodic, merciful, merry, messy, mighty, mindless, mischievous, miscreant, miserable, miserly, mistrustful, mocking, modern, modest, moody, moral, motivated, muddled, mundane, murky, mushy, musical, mysterious, naive, nappy, narcissistic, narrow-minded, nasty, natural, naughty, navigable, nauseating, neat, needy, neighborly, nervous, new, nice, nifty, nippy, nonchalant, nondescript, normal, nostalgic, nosy, noxious, nurturing, nutty, obedient, obnoxious, obscene, obsequious, observant, obsessive, obvious, odd, offbeat, old, open, open-minded, opinionated, optimistic, orderly, ordinary, organized, outgoing, outrageous, outspoken, outstanding, overbearing, overconfident, overjoyed, overt, painful, painstaking, pampered, panicky, paranoid, parsimonious, partial, particular, passionate, passive, pathetic, peaceful, perfect, periodic, perky, permissible, persevering, persistent, personable, pessimistic, petite, phlegmatic, phobic, phony, pious, pitiful, placid, plain, plausible, pleasant, pleasing, plucky, pointless, polite, political, poor, popular, possessive, powerful, powerless, practical, precious, prejudiced, presentable, pretty, prickly, prideful, prim, private, productive, protective, proud, psychotic, puerile, puffy, punctual, puny, purposeful, put-together, puzzled, quaint, quarrelsome, questioning, quick, quiet, quizzical, radical, ragged, reassured, rainy, ranunculaceous, ratty, real, realistic, reasonable, reassuring, rebel, rebellious, receptive, reckless, red, refined, reflective, refreshing, relaxed, reliable, relieved, religious, repulsive, reserved, resolute, respectful, responsible, responsive, reverent, revolutionary, rhetorical, rich, ridiculous, righteous, rightful, rigid, ritzy, robust, romantic, rough, round, royal, ruddy, rude, rustic, ruthless, sad, safe, saintly, sarcastic, sassy, satisfied, satisfying, saucy, scandalous, scary, scatter-brained, scientific, scrawny, scrupulous, secretive, secure, sedate, seductive, seemly, selective, self-assured, self-centered, self-centered, self-confident, self-conscious, self-effacing, selfish, sensible, sensitive, sentimental, serious, shallow, sharp, shocking, short, shrewd, shy, sickening, silly, simple, simple-minded, sincere, single-minded, skeptical, skilful, skillful, skinny, skittish, slack, sleepy, sloppy, slow, sluggish, small, smart, smart-alecky, smelly, smiling, smooth, smug, sneaky, snobbish, snobby, snotty, sociable, social, soft, soggy, solid, somber, sordid, sore, sour, spacey, spectacular, spellbinding, spendthrift, spicy, spiritual, spiteful, splendid, spoilt, spontaneous, spooky, spurious, squalid, square, squeamish, stable, statuesque, steadfast, stereotyped, sterile, stiff, stimulating, stingy, strange, strict, striking, strong, structured, stubborn, stuck-up, studious, stupid, stylish, subdued, successful, succinct, sulky, super, supercilious, superficial, superstitious, sweet, sympathetic, taciturn, tacky, tactful, tactless, talented, talkative, tall, tame, tantalizing, tart, tasteful, tawdry, tearful, tender, tense, terrible, testy, thankful, theoretical, thick-skinned, thoughtful, thoughtless, threatening, thrifty, thrilling, tidy, tight, tightfisted, timid, tiny, tired, tireless, tiresome, tolerant, touchy, tough, towering, tranquil, trendy, tricky, troubled, truculent, trusting, trustworthy, truthful, trying, two-faced, typical, ugly, unadvised, unbiased, uncertain, unchanging, uncommunicative, uncompromising, unconcerned, understanding, undesirable, uneasy, unemotional, unexciting, unforgiving, unfriendly, unhappy, unhealthy, uninhibited, uninterested, unique, unlucky, unreachable, unrepentant, unscrupulous, unselfish, unstable, unsuitable, unsure, unusual, unwavering, unwell, unworried, upbeat, uppity, upset, uptight, utopian, vagabond, vague, vain, valued, vast, vengeful, venomous, versed, vicious, victorious, vigorous, violent, vivacious, vocal, voiceless, volatile, voracious, vulgar, vulnerable, wacky, wakeful, wandering, wanting, warm, wary, wasteful, watchful, watery, weak, wealthy, weary, weird, well-balanced, well-behaved, well-bred, well-dressed, well-informed, well-liked, well-loved, well-spoken, whimsical, wholesale, wicked, wide-eyed, wild, willing, wiry, wise, wistful, witty, wonderful, wooden, woozy, worldly, worried, worthless, wrathful, wretched, wrong, wry, yielding, young, youthful, yummy, zany, zealous, zonked}

Context

☐ Definition of Rational and Behavioral agents

- Rational agent = Practical Reasoning in Artificial Intelligence
    - Autonomous agents: ACT-R (Anderson) , SOAR (Laird) architectures
    - Multi-agents: BDI architectures (Bratman, Rao, Georgeff) are JAM, JESS, JACK, PSI, 2APL, JASON, …

    Actions, Plans, Decision-making

- Behavioral agent = *Computational* approach to Psychological phenomena
    - Multi-agents: CoJACK (Norling), 2APL (Dastani), eBDI (Jiang), …
    - Believable agents: Cybercafe (Bates, Hayes-Roth and Rousseau)
    - ECA: SOAR-based (Gratch), PSI-based for FATIMA (Paiva, Lim), PRODIGY (Rizzo), …

    Emulation of human-like behavior

☐ The R&B framework

- The relationships between the rational and psychological reasoning capacities of an agent are **intricate**:
    - Ellsworth, P.C., Scherer, K.R.: Appraisal processes in emotion. In Davidson, R.J., Scherer, K.R., Goldsmith, H.H., eds.: Handbook of affective sciences. Series in affective science. Oxford University Press, New York, NY, USA (2003) 572–595
    - Frijda, N.H.: The Laws of Emotion. Psychology Press (2006)

- We propose a computational framework dedicated to experimental studies about Rational and Behavioral (R&B) agents, with two main principles:
    - **Separation**: Rational heuristics and Behavioral heuristics are designed separately, then combined in the R&B simulator
    - **Genericity**: A common software layer supporting various R&B combining strategies

    We need a grounding for behavioral heuristics

The description of a person

☐ **Sources in Psychology literature**

- Lexical approach: Adjectives/adverbs (Baumgarten 1933, Allport and Odbert 1936)

  "The lexical hypothesis states that most of socially relevant and salient personality characteristics have become encoded in the natural language"

  — Goldberg et al. Five Factor Model (OCEAN)

  — Costa and McCrae NEO PI-R facets for OCEAN

- Introspective approach: Questionnaires

  — Eysenck's Personality Questionnaires (EPQ)

  — Cattell's 16 PF

☐ **First-level taxonomy of adjectives**

- Rational properties of a person (¬social)

  — Physical, Mental: *bald, competent*

  — Intrinsic, Relative: *left-handed, pretty*

  — Static, Dynamic: *red-haired, breathless*

- Psychological properties of a person →

  — Intrinsic, interpersonal : *lazy, talkative*

  — Static, Dynamic: *ambitious, angry*

	Intrinsic	**Interpersonal**
Static	TRAITS	ROLES (psychological impact)
Dynamic	MOODS (Mind-states, Emotions)	AFFECTS (Mind-states, Emotions)

O.C.E.A.N. traits
NEO PI-R facets

Choice of OCEAN traits
- Most used since 2000
- Standard

Choice of NEO PI-R facets
- Most used since 1992
- Most refined: 30 facets
- OCEAN-based (6 facets by trait)

Table 1: Facets for the Big five trait domain: three approaches (alignment according to John et al judgment, based on (John et al., 2008))

OCEAN Classes	Lexical facets (N = 18) (Saucier & Ostendorf, 1999)	NEO-PI-R facets (N = 30) (Costa & McCrae, 1992)	CPI-Big five facets (N = 16) (Soto & John, 2008)
Extraversion	Sociability Assertiveness - Activity/Adventurousness - - Unrestraint (A Warmth/Affection)[a]	- Gregariousness Activity Excitement seeking - Positive emotions Extraversion Warmth	- Gregariousness - (O Adventurousness)[a] Social confidence (vs Anxiety) - - -
Agreeableness	Warmth/Affection Modesty/Humility - - Generosity Gentleness -	(E Warmth)[a] Modesty Trust Tender-Mindedness - Compliance Straightforwardness	- Modesty (vs Narcissism) Trust (vs Suspicion) Empathy/sympathy Altruism - -
Conscientiousness	Orderliness Industriousness[b] Reliability Decisiveness - (O Perceptiveness)[a] -	Order Achievement striving Dutifulness - Self-discipline Competence Deliberation	Orderliness - Industriousness[b] - Self-discipline - -
Neuroticism	Insecurity Emotionality Irritability - - - - -	Anxiety - Angry hostility Depression - Self-consciousness Vulnerability Impulsiveness	Anxiety - Irritability Depression Rumination-compulsiveness (E Social confidence (vs Anxiety))[a] - -
Openness	Intellect - Imagination/creativity - - - Perceptiveness	Ideas Aesthetics Fantasy - Actions Feelings Values -	Intellectualism Idealism - Adventurousness - - -

18   **30**   **16**

a. Facet names in italics correspond to a secondary attachment of an already existing facet.
b. Despite a same name in two classifications, Industriousness doesn't have exactly the same meaning, explaining that the two aren't aligned.

Motivation

☐ **Four main problems with state of the art resources**

- **Genericity** OCEAN Traits are too generic for computational implementation. Facets refine OCEAN but are still too generic

- **Poles** Traits and Facets include both positive and negative (antonym) poles: A-Modesty can stand for adjectives like *mild* as well as *arrogant* (some authors propose pole-based taxonomies)

- **Semantics** Adjectives are considered to have a single lexical semantic meaning, often 'taken for granted' while in WordNet words have several senses: e.g. *friendly* (4), *kind* (3), *lively* (6), …

- **Resources** Data are not easily accessible, old, partial, …

☐ **Completing the standard OCEAN/NEO PI-R taxonomy using WordNet**

- **Genericity** Use dictionary-based glosses instead of category names

- **Poles** Separate concepts from antonym(s)

- **Semantics** Use WordNet precise lexical semantics (synsets)

- **Resources** Build an XML resource freely available on the Internet

Methodology

Phase 1: Selection of a set of personality adjectives

- Selection of 11 sources of personality adjectives from the Internet
- Sort the Union of the adjectives according to their Salience in the sources
- Discard adjectives non tractable with Wordnet
- Build from WordNet a base of unique triplets: Word-Synset-Gloss (WSG)
- Select WSG triplets actually describing the traits of a person (Double annotation)

Phase 2: Classification of WSG triplets in the OCEAN/NEO PI-R Taxonomy

- Build an annotating tool based on OCEAN/NEO PI-R
- Perform a double annotation process
- Statistical results: coverage of the OCEAN/NEO PI-R 2-levelled tree by the triplets
- Build an XML resource file, accessible freely on the Web

Phase 3: Elicitation of influence operators

- *For each OCEAN/NEO PI-R position elicit the behavioral schemes associated with the triplets*
- *Define the influence operators required to implement the schemes*
- *Classify the operators*
- *Implement the operator into the R&B framework*
- *Evaluate*

A corpus of 1000 personality adjectives

Table 2: Sources of personality adjectives for the corpus $\mathcal{C}_{\text{coll}}$

N°	Sources	Count
1	http://personal.georgiasouthern.edu/~jbjoy/Adjectives.html	315
2	http://www.keepandshare.com/doc/view.php?u=12894	182
3	http://www.lingolex.com/personalidad.htm	52
4	http://www.lesn.appstate.edu/fryeem/RE4030/character_trait_descriptive_adje.htm	183
5	http://www.mckinnonsc.vic.edu.au/la/lote/german/materials/describe/pers-adj.htm\#top	362
6 [a] {	http://www.learnenglish.de/grammar/adjectivepersonality.htm\#positive http://www.examples-help.org.uk/parts-of-speech/personality-adjectives.htm	277
7 [b]	http://www.esldesk.com/vocabulary/adjectives.htm	445
8	http://jobmob.co.il/blog/positive-personality-adjectives	130
9	http://www.nonstopenglish.com/exercise.asp?exid=440	20
10	http://www.scribd.com/doc/2212798/Adjective-List	80
	Total	2046
	Total of union (words different)	1055

a. List 6 is merged from two closely related sources.
b. List 7 is taken from a list of general adjectives, from which we selected those about persons.

$\mathcal{C}_{\text{coll}}$ = 1055 $\mathcal{C}_{\text{WN}}$ = 1005

WordNet tractable = existing as adjectives in the WordNet base

The salience of personality adjectives
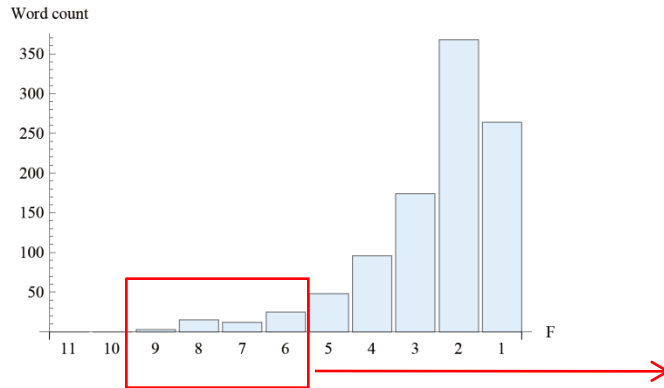
Figure 1: Histogram of salience of personality adjectives in the corpus $\mathcal{C}_{\text{WN}}$

Definition

w_a = Number of citations in the sources files $\in [1,11]$

Note: another useful salience factor would be the traditional word frequency over English texts (domain independent).

Table 3: Most salient $\mathcal{C}_{\text{WN}}$ adjectives $Total = 55$. Alphabetical order is used when same w_a

w_a	Adjectives	Count
9	friendly, kind, lively	3
8	ambitious, calm, cheerful, clumsy, crazy, energetic, excited, funny, gentle, helpful, proud, quiet, silly, talented, warm	15
7	bad, brave, bright, courageous, generous, good, happy, lazy, nervous, sensitive, successful, tough	12
6	anxious, careless, charming, cooperative, determined, dull, eager, enthusiastic, exuberant, fair, faithful, fantastic, jealous, loyal, mature, nice, placid, pleasant, sad, shy, thoughtful, unusual, wise, wonderful, zany	25

WordNet Word-Synset-Gloss (WSG) triplets

Table 4: $\mathcal{B}_{\text{all}}$ entries for adjectives from $\mathcal{C}_{\text{WN}}$ ranked with $w_a = 9$

w_a	Adjective	No	Synset	Gloss
9	friendly		Pally	characteristic of or befitting a friend
9		*	~~Allied~~	~~of or belonging to your own country's forces or those of~~ an ally
9		*	~~Easy~~	~~easy to understand or use~~
9			Favorable	inclined to help or support; not antagonistic or hostile
9	kind		Tolerant	tolerant and forgiving under provocation
9			Genial	agreeable, conducive to comfort
9			Openhearted	having or showing a tender and considerate and helpful nature; used especially of persons and their behavior
9	lively		Vital	full of spirit
9		*	~~Eventful~~	~~filled with events or activity~~
9			Frothy	full of life and energy
9		*	~~Springy~~	~~elastic; rebounds readily~~
9			Alert	quick and energetic
9			Racy	full of zest or vigor

W   **S**   **G**

Annotating WSG triplets into NEO PI-R facets

Screen shot of the annotating tool interface

Histogram of WSG triplets associated with the facets
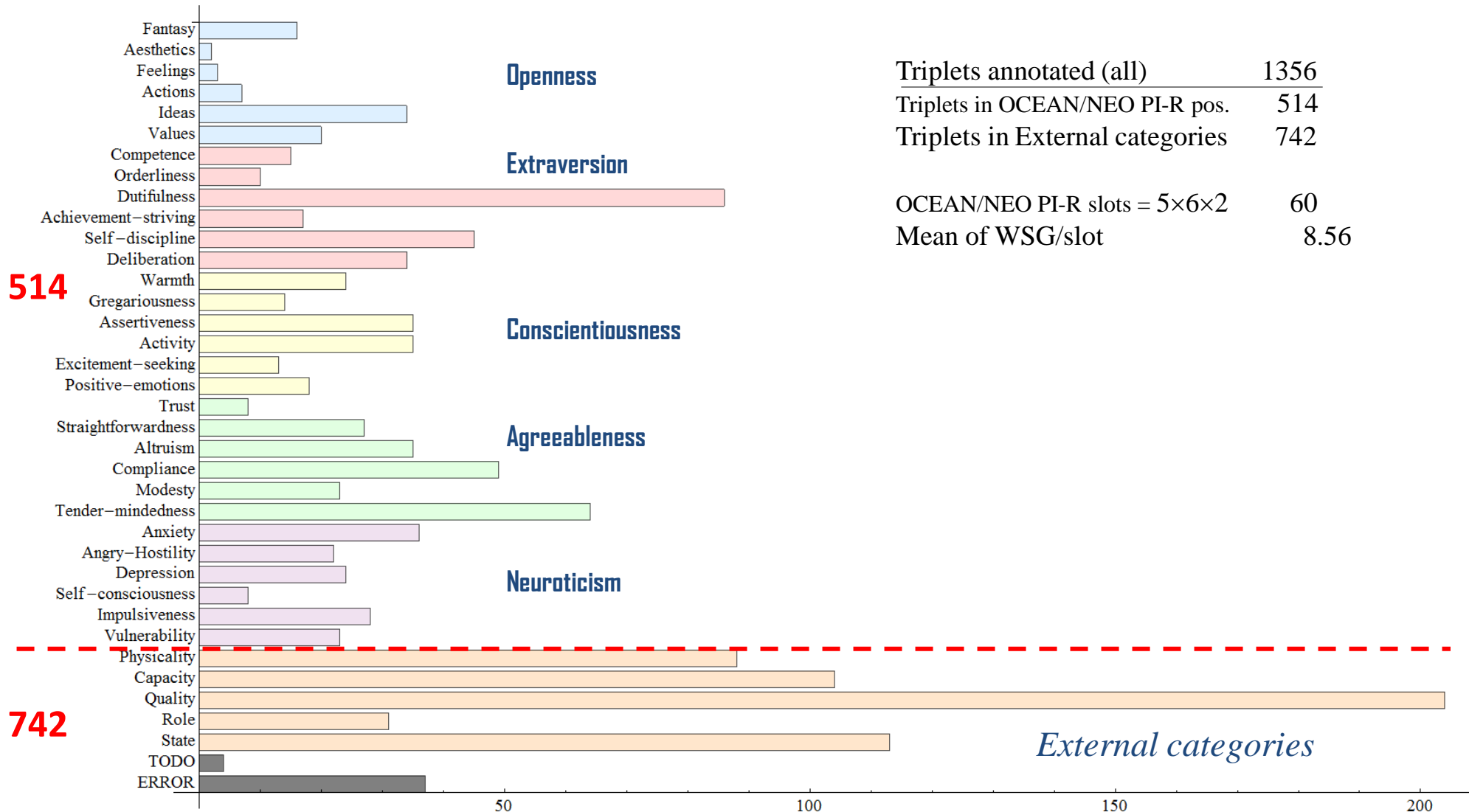
Triplets annotated (all)	1356
Triplets in OCEAN/NEO PI-R pos.	514
Triplets in External categories	742
OCEAN/NEO PI-R slots = $5\times6\times2$	60
Mean of WSG/slot	8.56

Conclusion

The XML resource file

- Freely accessible and downloadable
- At the R&B project Web page ➡

Further work: Phase 3

- Scheme elicitation
- Influence operators definition
- Implementation in R&B
- Evaluation

http://www.limsi.fr/~jps/research/rnb/rnb.htm

OCEAN trait

NEO PI-R facet

Pole

G-W-S triplet

Openness

Fantasy

+

not sensible about practical matters; idealistic and unrealistic
[romantic, WildEyed, 5]

having the ability to produce or originate
[productive, Generative, 4]

concerned with sacred matters or religion or the church
[religious, Spiritual, 4] [spiritual, Religious, 3]

promoting construction or creation
[creative, Constructive, 3]

having the ability or power to create
[creative, Originative, 3]

(used of persons or artifacts) marked by independence and creativity in thought or action
[imaginative, Imaginative, 3] [inventive, Inventive, 3]

concerned with or affecting the spirit or soul
[spiritual, Unearthly, 3]

showing great reverence for god
[godly, Worshipful, 2] [reverent, Worshipful, 2]

Salience

–

unimaginatively conventional
[conservative, ButtonDown, 3]

guided by practical experience and observation rather than theory
[practical, Hardheaded, 3] [hardheaded, Pragmatic, 2]

aware or expressing awareness of things as they really are
[realistic, Virtual, 3]

freed from illusion
[disillusioned, Disillusioned, 2]

sensible and practical
[earthy, DownToEarth, 2]

denying or questioning the tenets of especially a religion
[skeptical, Unbelieving, 2]

concerned with the world or worldly matters
[mundane, Terrestrial, 1]

deficient in originality or creativity; lacking powers of invention
[sterile, Uninspired, 1]

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