

# The role of metaphor in semantic extensions of sensory adjectives

(感覚形容詞の意味拡張におけるメタファーの役割)

Mika SHINDO, Masaki MURATA, and Hitoshi ISAHARA  
*Keihanna Human Info-Communications Research Center*  
*Communications Research Laboratory*  
{mshindo, murata, isahara}@crl.go.jp



# Studies on semantic extensions of sensory/perception predicates

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- Semantic extensions across sensory modalities within perception
  - Adjectives: Ullmann 1951, Williams 1976.
  - Verbs: Viberg 1983, Evans and Wilkins 2000.
- Semantic extensions from perception to cognition
  - Adjectives: a part of metaphorical expressions (e.g. Affection is warmth/Dislike is cold. Intelligence is a Light Source.)
  - Verbs: Sweetser 1990, Haser 2000, Evans and Wilkins 2000.

# Semantic Extensions across sensory modalities within perception

## Sensory adjectives: Ullmann (1951)

- An investigation of the whole poetical works of some authors in 19<sup>th</sup>-century. (e.g. *sweet sound, loud perfume, soft voice, sparkling noise, black silence*.)
- "The dotted line also constitutes the dividing-line between upward and downward processes."

[Keats]		DESTINATION						
		Touch	Heat	Taste	Scnt	Sound	Sight	Total
S O U R C E	Touch	--	1	--	2	39	14	56
	Heat	2	--	--	1	5	11	19
	Taste	1	1	--	1	17	16	36
	Scnt	2	--	1	--	2	5	10
	Sound	--	--	--	--	--	12	12
	Sight	6	2	1	--	31	--	40
	Total	11	4	2	4	94	58	173

# Semantic Extensions across sensory modalities within perception

## Sensory adjectives: Ullmann (1951)

- “Numerical evidence overwhelmingly indicates a general trend of movement.”

AUTHOR	UPWARD	DOWNWARD	TOTAL
Byron	175	33	208
Keats	126	47	173
Morris	279	23	302
Wilde	337	77	414
'Decadents'	335	75	410
Longfellow	78	26	104
Leconte de Lisle	143	22	165
Gautier	192	41	233
TOTAL	1665	344	2009

# Semantic Extensions across sensory modalities within perception

## Sensory adjectives: Ullmann (1951)

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- A unidirectional tendency in intersensorial transfers.
  - Transfers tend to mount from the less differentiated sensations to the more differentiated ones, and not *vice versa*.
  - Touch is the main source of transfers.
  - Sound is the main destination, definitely superior to sight.
  - Touch is very closely connected with heat; smell is also correlated with taste.

# Semantic Extensions across sensory modalities within perception

## Sensory adjectives: Williams (1976)

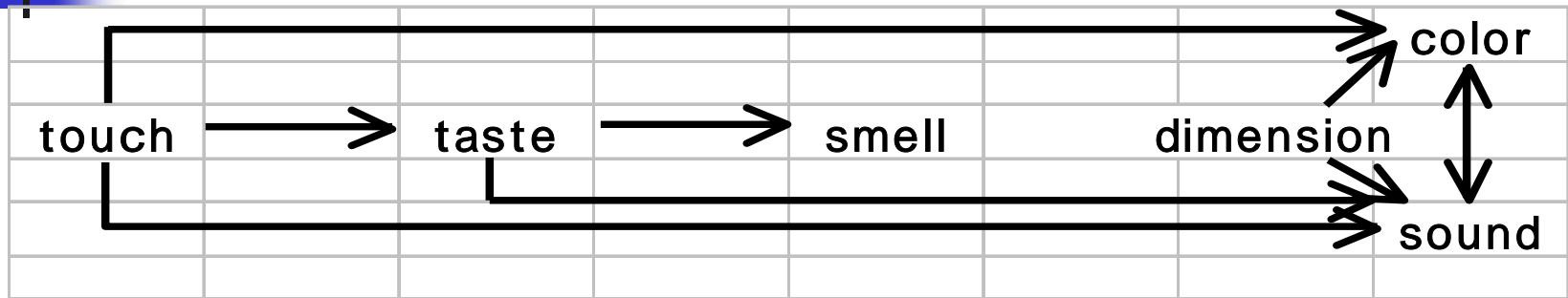
- A diachronic approach based on cited meanings of sensory adjectives in the OED, the MED and Webster's Third.

(cf. Ullmann: synchronic, poetic examples)

	TOUCH	TASTE	SMELL	DIMENSION	COLOR	SOUND
dull	1230				1430	1475
sour		1000	1340			W3

# Semantic Extensions across sensory modalities within perception

## Sensory adjectives: Williams (1976)



- 97% of first-order transfers and 89% of post-first-order transfers in English follow this prediction.
- The development of cognates in the several Indo-European languages strongly supports this pattern.
- 91% of transfers in a non-IE language, Japanese, follow this prediction.

# Semantic Extensions across sensory modalities within perception

## Perception verbs: Viberg (1983)

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- The field of perception
  - five field-specific components: *sight, hearing, touch, taste, and smell.*
  - three field-independent components: *activity, experience, and copulative.*
- Prototypical sentences, e.g. a case of sight,  
“Peter looked at the birds.” (activity),  
“Peter saw the birds.” (experience),  
“Peter looked happy.” (copulative).  
=> translated to 53 languages representing 14  
different language stocks.



# Semantic Extensions across sensory modalities within perception

## Perception verbs: Viberg (1983)

- Most languages use fewer than 15 verbs to cover the 15 meanings of the basic paradigm.

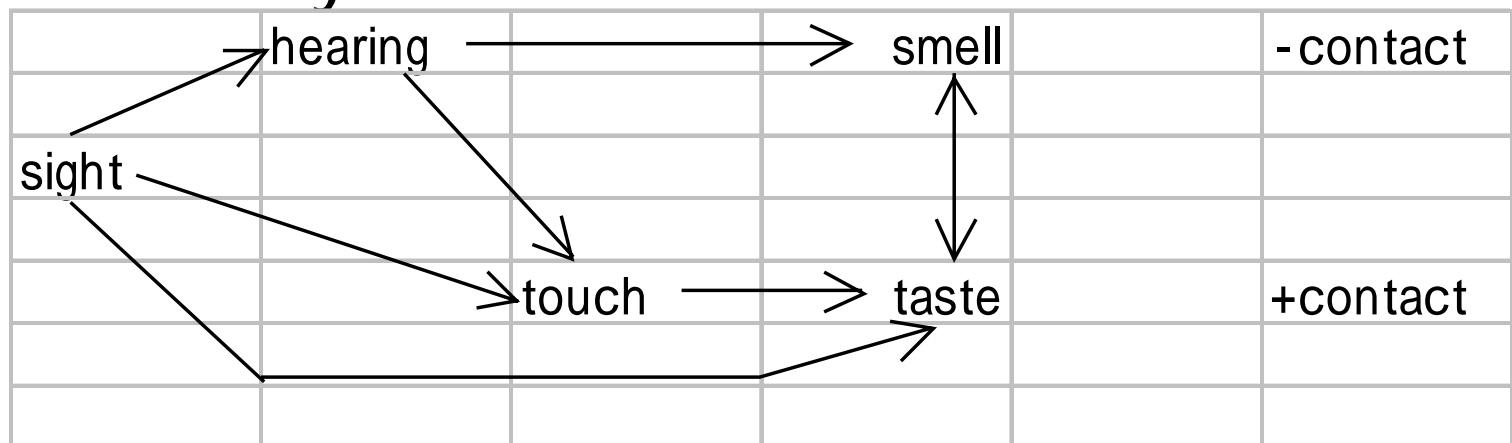
	ACTIVITY (CONTROLLED)	EXPERIENCE (NONCONTROLLED)	SOURCE-BASED COPULATIVE (STATE)
sight	look at	see	look
hearing	listen to	hear	sound
touch	feel <sub>1</sub>	feel <sub>2</sub>	feel <sub>3</sub>
taste	taste <sub>1</sub>	taste <sub>2</sub>	taste <sub>3</sub>
smell	smell <sub>1</sub>	smell <sub>2</sub>	smell <sub>3</sub>

- (e.g. Japanese, *azi o miru*, *azimi*, *kikizake*, *kou o kiku*.)

# Semantic Extensions across sensory modalities within perception

## Perception verbs: Viberg (1983)

- A verb having a basic meaning belonging to a sense modality higher in the hierarchy can get an extended meaning that covers some (or all) of the sense modalities lower in the hierarchy.





# Comparison of Williams' and Viberg's hierarchies

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- The order is reversed between touch and hearing, or touch and sight.
  - Adjectives: intensity and evaluation,  
Verbs: degree of certainty (implication) (Viberg 1984)
  - Tactile: individual sensation → description → adjectives  
Visual or hearing: general (common) sensation → representatives of perception → verbs (Shindo)
  - Adjectives: stative, passive → tactile  
Verbs: motive, active → visual (p.c. Nabeshima)



# Comparison of Williams' and Viberg's hierarchies

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- Even categorized to the same sensory/perception predicates, sensory adjectives and perception verbs behave differently.



# Semantic Extensions from perception to cognition

## Sensory adjectives:

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- Affection Is Warmth/ Dislike Is Cold.
  1. She's a warm person.
  2. They gave me a warm welcome.
  3. He took a while to warm up to me.
  4. My love for her still smolders (she's an old flame)
  5. She was decidedly cool.
  6. He gave me the cold shoulder.
  7. He's a real cold fish.
- Intelligence Is A Light Source
  1. He is very bright.
  2. He can always shed light on the problem.
  3. I always thought he was a little dim.

(<http://cogsci.berkeley.edu/>)



## Semantic Extensions from perception to cognition

### Perception verbs: Sweetser (1990)

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- “The vocabulary of physical perception shows systematic metaphorical connections with the vocabulary of the internal self and internal sensations.”
  - vision → knowledge, intellection,
  - hearing: “listen” → “heed” → “obey,”
  - taste → personal likes and dislikes,
  - smell – (fewer and shallower metaphorical connections)
  - touch → emotional feeling



## Semantic Extensions from perception to cognition

### Perception verbs: Haser (2000)

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- “Even if the VISION/INTELLECTION metaphor may outweigh other drifts originating in verbs of seeing, large-scale comparison reveals further options.”
  - See/look/watch → visit
  - See → beware, be careful
  - See → take care of/look after
  - See → wait, expect



## Semantic Extensions from perception to cognition

### Perception verbs: Evans and Wilkins (2000)

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- “Australian languages recruit verbs of cognition like ‘think’ and ‘know’ from ‘hear’, but not from ‘see’.”
  - hear/listen → heed, obey
  - hear/listen → understand
  - hear/listen → think
  - hear/listen → know
  - hear/listen → remember

(cf. Goddard and Wierzbicka 1994)





## Semantic Extensions from perception to cognition

### Perception verbs: Evans and Wilkins (2000)

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- Viberg's proposal (within perception)  
→ true
- Sweetser's proposal (from perception to cognition)  
→ false



# Semantic Extensions from perception to cognition


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- Transfers of sensory words into the domain of cognition is far more open to cultural variation than extensions within the domain of perception.
- Even for one language, more exhaustive studies are needed, especially for adjectives.



# Corpus-based automatic classification

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- Semantic extensions from perception to cognition
- 65 Sensory adjectives (cf. Williams 1976)
- Attributive use of adjectives  
(adjective-noun constructions)  

- British National Corpus (100 millions words)
- WordNet 2.0 (a hierarchical thesaurus)



# 65 sensory adjectives (1)

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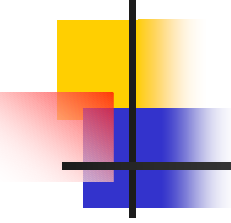
- TEMPERATURE: cold, cool, hot, warm. (4 words);
- TOUCH: aspre, bitter, bland, cloying, coarse, crisp, dry, dull, grave, hard, harsh heavy, keen, (light), mild, piquant, poignant, pungent, rough, sharp, smart, smooth, soft (23 words);



## 65 sensory adjectives (2)

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- TASTE: acrid, austere, brisk, dulcet, eager, mellow, sour, sweet, tart (9 words);
- DIMENSION: acute, big, deep, empty, even, fat, flat, full, high, hollow, level, little, low, shallow, small, thick, thin, plain (18 words);
- VISION: bright, brilliant, clear, dark, dim, faint, (light), vivid (8 words);
- SOUND: loud, quiet, shrill, strident (4 words).



# Examples of adjective-noun constructions (1)

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- sharp knife:

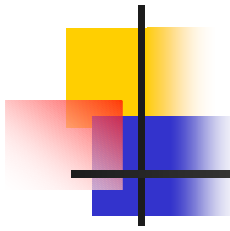
knife = cutting instrument

→ sharp = describing a physical object

- sharp pain:

pain = a sensation in bodily function

→ sharp = describing a psychological feature



# Examples of adjective-noun constructions (2)

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- sharp contrast:

contrast = an opposite relation

→ sharp = describing a relation

- sharp increase:

increase = a change, a happening

→ sharp = describing some change

# Frequencies of modified nouns

	TEMPERATURE [8440]	TOUCH [2053]	TASTE [1739]	DIMENSION [8425]	VISION [1155]	SOUND [2333]
1	water 1243	work 1229	smell 83	bit 1698	hair 420	voice 180
2	air 362	disk 310	shop 45	level 1166	light 278	life 78
3	weather 307	time 233	taste 42	number 1107	idea 243	noise 41
4	day 166	rain 212	tooth 41	girl 1027	green 177	man 40
5	welcome 166	way 168	smile 36	boy 914	side 162	music 39
6	war 139	weather 162	tea 29	proportion 851	view 162	corner 38
7	drink 119	ground 151	face 27	man 830	evidence 158	day 32
8	bath 100	water 150	walk 26	group 706	head 148	place 32
9	wind 96	end 148	cream 22	house 615	red 142	word 31
10	place 95	contrast 144	scent 21	time 595	smile 135	enjoyment 30
11	summer 93	day 142	wine 21	breath 589	picture 126	way 29
12	room 90	currency 131	way 20	voice 551	water 117	possession 29
13	sun 84	voice 127	note 20	amount 543	indication 115	spot 25
14	night 77	interest 126	voice 20	part 524	day 106	room 24
15	milk 70	surface 120	flavour 19	degree 519	understanding 106	time 23
16	blood 70	look 110	smoke 19	room 473	distinction 101	street 22
17	smile 68	man 109	walking 17	cost 461	night 95	road 21
18	tea 66	core 105	pace 17	thing 455	colour 95	period 21
19	light 64	case 104	trade 16	range 452	example 85	bang 20
20	tap 62	skin 102	milk 15	standard 432	room 82	confidence 19



# Frequencies of modified nouns

	TEMPERATURE [8440]	TOUCH [2053]	TASTE [1739]	DIMENSIONS [8425]	VISION [11558]	SOUND [2333]
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3	weather 307	time 233	taste 42	number 1107	idea 243	noise 41
4	day 166	rain 212	tooth 41	girl 1027	green 177	man 40
5	welcome 166	way 168	smile 36	boy 914	side 162	music 39
6	war 139	weather 162	tea 29	proportion 851	view 162	corner 38
7	drink 119	ground 151	face 27	man 830	evidence 158	day 32
8	bath 100	water 150	walk 26	group 706	head 148	place 32
9	wind 96	end 148	cream 22	house 615	red 142	word 31
10	place 95	contrast 144	scent 21	time 595	smile 135	enjoyment 30
11	summer 93	day 142	wine 21	breath 589	picture 126	way 29
12	room 90	currency 131	way 20	voice 551	water 117	possession 29
13	sun 84	voice 127	note 20	amount 543	indication 115	spot 25
14	night 77	interest 126	voice 20	part 524	day 106	room 24
15	milk 70	surface 120	flavour 19	degree 519	understanding 106	time 23
16	blood 70	look 110	smoke 19	room 473	distinction 101	street 22
17	smile 68	man 109	walking 17	cost 461	night 95	road 21
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# Classifications of meanings of nouns

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- Classification by personal judgements  
→ *ad hoc*.
- Classification by a thesaurus → more convincing.



# Classification by WordNet 2.0

(%)

Adjectives	Frequency	entity	psychological feature	abstraction	state	event	human action	group, grouping	possession	phenomenon
TEMPERATURE	8440	53.9	4.4	16.3	5.6	1.9	7.7	1.4	0.2	8.5
TOUCH	20531	35.3	9.2	20.7	5.0	4.1	15.3	3.9	1.1	5.4
TASTE	1739	37.8	16.5	21.3	5.1	1.6	9.8	3.9	0.3	3.8
DIMENSION	84257	36.2	6.7	26.6	5.9	3.3	8.4	7.2	3.0	2.7
VISION	11558	34.8	16.8	27.4	3.6	2.6	7.9	2.5	0.3	4.1
SOUND	2333	22.8	9.2	35.3	6.7	11.3	9.7	2.5	0.6	1.9
Total	128858	36.9	8.1	25.1	5.5	3.4	9.4	5.7	2.2	3.6

# Classification by WordNet 2.0

(%)

Adjectives	Frequency	entity	psychological feature	abstraction	state	event	human action	group, grouping	possession	phenomenon
TEMPERATURE	8440	53.9	4.4	16.3	5.6	1.9	7.7	1.4	0.2	8.5
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Total	128858	36.9	8.1	25.1	5.5	3.4	9.4	5.7	2.2	3.6

- Adjectives: TOUCH → VISION (Williams 1976)
- Verbs: VISION → TOUCH (Viberg 1983)

# Comparison between Temperature and Vision domain

Adjectives	Frequency	entity	psychological feature	abstraction	state	event	human action	group, grouping	possession	phenomenon
cold	2784	51.6	4.9	13.7	4.5	2.6	11.0	1.3	0.2	10.2
cool	807	39.7	8.1	27.6	3.8	1.1	11.6	2.1	0.2	5.7
hot	2959	65.4	2.5	15.3	1.6	1.9	5.1	1.1	0.3	6.9
warm	1890	45.3	5.2	17.2	14.4	1.3	5.0	2.0	0.1	9.5
TEMPERATURE	8440	53.9	4.4	16.3	5.6	1.9	7.7	1.4	0.2	8.5
bright	1357	41.1	6.7	29.5	2.1	3.2	1.7	2.6	0.3	12.7
brilliant	1083	33.3	11.6	22.4	2.0	4.3	17.3	3.5	0.8	4.8
clear	4329	17.0	28.7	32.9	4.0	2.4	11.2	1.8	0.3	1.7
dark	3403	63.0	3.8	19.8	3.0	0.7	4.0	3.5	0.2	2.1
dim	294	30.6	29.2	13.3	5.7	0.4	3.1	0.6	0.9	16.1
faint	706	10.9	19.0	38.2	7.5	10.9	4.9	1.2	0.2	7.3
vivid	386	16.2	34.5	29.5	5.8	2.1	8.9	1.2	0.1	1.6
VISION	11558	34.8	16.8	27.4	3.6	2.6	7.9	2.5	0.3	4.1

- Temperature: **entity** – more frequent
- Vision: **abstraction, psychological feature** – more frequent.



# Scalar predications

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- <hot, warm, cool, cold>  
<brilliant, vivid, bright, clear, faint, dim, dark> = scalar predications
- Are these predications mapped to abstract domains (emotion, intellection) in a systematic way?



# Temperature domain

(%)

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cool	807	39.7	8.1	27.6	3.8	1.1	11.6	2.1	0.2	5.7
hot	2959	65.4	2.5	15.3	1.6	1.9	5.1	1.1	0.3	6.9
warm	1890	45.3	5.2	17.2	14.4	1.3	5.0	2.0	0.1	9.5
TEMPERATURE	8440	53.9	4.4	16.3	5.6	1.9	7.7	1.4	0.2	8.5

- A startling contrast seems to exist between two pairs, *hot* and *cold*; *warm* and *cool*.



# Abstract meanings of “hot”

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- Abstraction (15.3%)
  - Quantity (11.1%): summer, day, afternoon, night etc.
  - Attribute (1.6%): --
  - Relation (2.5%): news (13) (“new, recent, and fresh”), topic (10) (“receiving a lot of publicity”), money (9) (“very valuable but illegally obtained”).
- Emotional meanings: [entity] blood, [psychological feature] pursuit, temper.



# Abstract meanings of “cold”

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- Abstraction (13.7%)
  - Quantity (8.4%): day, night, winter, morning etc.
  - Attribute (3.2%): **voice**, **look**, manner etc.
  - Relation (2.1%): smile (11).
- Emotional meanings: [**entity**] **blood** (50), **sweat** (34), **shoulder** (27).



# Abstract meanings of “warm”

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- Abstraction (17.2%)
  - Quantity (6.1%): day, night, evening, summer etc.
  - Attribute (5.2%): glow, **personality**, **voice** etc.
  - **Relation** (5.9%): **smile** (42), **reception** (18), **tribute** (7), **praise** (6), **hospitality** (6) etc.
- **State** (14.4%): **welcome** (164) etc.



# Abstract meanings of “cool”

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- Abstraction (27.6%)
  - Quantity (5.9%): night, temperature, period etc.
  - Attribute (11.3%): voice, composure, elegance etc.
  - **Relation** (10.3%): **smile** (15), **reception** (12), **response** (10), **tone** (5) etc.
- **Action** (11.6%): **look** (18), **glance** (9), **gaze** (5) etc.



# Comparison between hot/cold and warm/cool

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- **hot/cold** + [**entity** (e.g. blood, voice, sweat)]
  - ➔ abstract (emotional) meanings
- **warm/cool** + [**abstract noun** (e.g. welcome, reception, response)]
  - ➔ abstract (emotional) meanings



# Vision domain

Adjectives	Frequency	entity	psychological feature	abstraction	state	event	human action	group, grouping	possession	phenomenon
bright	1357	41.1	6.7	29.5	2.1	3.2	1.7	2.6	0.3	12.7
brilliant	1083	33.3	11.6	22.4	2.0	4.3	17.3	3.5	0.8	4.8
clear	4329	17.0	28.7	32.9	4.0	2.4	11.2	1.8	0.3	1.7
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# Abstract meanings of “brilliant”

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- [Psychological feature] idea (39) etc.
- [Entity] man (19), player (9), book (9), student (8), scholar (5) etc.
- [human action] (17.3%) performance (21), career (17), save (11), goal (9), success (9), job (9), start (9) etc.
- “Brilliant” = excellence (“extremely clever,” “very good,” “very successful.”)



# Abstract meanings of “vivid”

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- [psychological feature] **imagination** (24), **memory** (19), **dream** (11), **impression** (8).
- “Vivid” keeps **visual image** even when used for extended meanings to describe abstract concepts.



# Abstract meanings of “bright”

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- [Psychological feature] idea (43) etc.
- [Entity] **boy** (22), **girl** (12), **child** (11), **pupil** (4) etc.
- [Abstraction] **future** (59), smile (32), tone (5) etc.
- “Bright”
  - ➔ **goodness** (“cheerful,” “pleasant,” “successful.”)
  - ➔ **intelligence** (persons)



# Abstract meanings of “clear”

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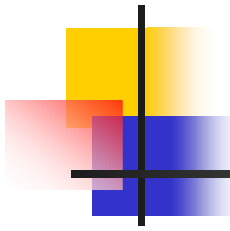
- [Psychological feature] **evidence** (156), **idea** (154), **view** (115), **understanding** (103), **distinction** (101), **vision** (39) etc.
- [Abstraction] **indication** (115), **statement** (81), **message** (56) etc.
- “clear”
  - ➔ **intelligence** (communicative contents)



# Abstract meanings of “faint,” “dim,” and “dark”

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- “faint”: smile (82), hope (26) (cf. light (24), glow(20).)
- “dim”: view (46), memory (5).
- “dark”: secret (19).
- Not so many uses for describing abstract meanings.



# Intellectual meanings of “brilliant,” “bright,” and “clear”

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- Brilliant → excellent (performance, career)
  - extremely clever (person)
  - · · the highest level of a scale,  
illuminating objects
- Bright → clever (person)
  - · · illuminating objects
- Clear → easy to understand (communicative content)
  - · · no obstructions in sight



# Concluding remarks

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- Semantic extensions of sensory adjectives → not so systematic, metaphorical connections.
- Metaphorical schedules (e.g. tactile → emotion, vision → intellection) → only loosely working on.
- Each word has extended characteristically, keeping its original features.
- Usage-based approaches are essential.



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ありがとうございました。

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御質問、コメント等、  
進藤 (mshindo@crl.go.jp) まで、  
よろしくお願い致します。