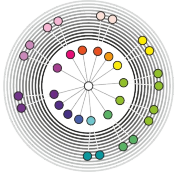




Verb argument structure and semantic relations: application to non-English language material

Maria Todorova, Hristina Kukova

**Institute for Bulgarian Language
Bulgarian Academy of Sciences**

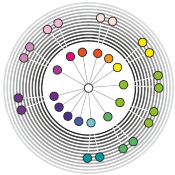


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Verb classes

Verb classes are sets of verbs sharing similar semantic properties, such as the membership to a common semantic domain or similar argument realization and semantic interpretation.

Fillmore (1970) emphasizes the importance of verb classes in various tasks including the study of the patterns of shared verb behavior; the organization of the verb lexicon; the identification of grammatically relevant elements of meaning.



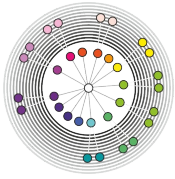
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Verbs of Contact

In general, the notion of CONTACT is understood as a “conceptual core element” of a predicate (Juffs, 1996).

The set of verbs of contact in WordNet features the ones included in the relevant lexicographer’s file, one of 15 files in which the verbs in WordNet are grouped according to the semantic domain to which they pertain, and is defined as “verbs of touching, hitting, tying, digging” (Miller et al., 1990). It is also the largest of them, consisting of more than 820 synsets including event and action verbs that share the semantic component of CONTACT or IMPACT.

- Verbs of Physical Contact via Motion
- State Verbs of Physical Contact



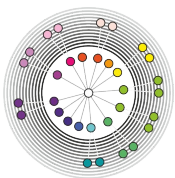
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Verbs of contact denoting attaching, detaching, placing, removing, filling and emptying

As a whole, these frames involve the movement of an entity (the Theme) either directed to (Goal) or originating from (Source) to a particular place. Their core frame elements share similar general restrictions – their Agents are volitional; the Cause denotes a physical entity or eventuality; the FE Item is a physical object, the Goal – a physical entity or container and the Connector – a physical entity.

The semantics of the point of physical contact defines two main subgroups:

- verbs of contact on or along a surface (as the verb root triya:2 5 (rub:2 eng-30-01249724- v) 'move over something with pressure' and its hyponyms – brush:7; gauge:6; scrub:3; smear:4; scrape:1, etc.
- verbs of contact with a container (as the verb roots palnya:1 (load:3 eng-30-01490336- v), izprazvam:8 (empty:7 eng-30-01488313-v) and their hyponyms



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Verbs of contact denoting attaching, detaching, placing, removing, filling and emptying

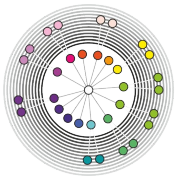
Verbs assigned the FrameNet frame **Filling**: ... filling Containers and covering areas with some thing(s) or substance – the Theme. The area or container can appear as the direct object with all these verbs, and is ... the goal of motion of the Theme.

The general selectional restrictions specified for the frame: for the Agent correspond to the WN root synset person:1 (eng-30-00007846-n); the ones defined for the FE Theme correspond to the WN root synset physical object: 1 (eng-30-00002684-n) or entity: 1 (eng30-00001740-n) and those specified for the Goal match the synset container:1 (eng-30-03094503-n)

Example (a) tovarya:1 (load:2 eng-30-01489989-v) 'fill or place a load on'

(b) the verb lakiram:1 (varnish:1 eng-30- 01269008-v) 'cover with varnish' imposes more specific restrictions to its core FEs.

The Agent is a volitional human being, a qualified person, while the Theme is a particular kind of substance best described by means of the synset lak:1 (varnish: 2 eng-30-04521987-n) and the Goal is a physical object:1 (eng-30-00002684-n) or a surface:1 (eng-30-08660339-n).



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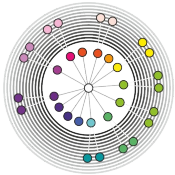
Verbs of Bodily Contact

Verbs assigned the FrameNet frame **Manipulation**: ... the manipulation of an Entity by an Agent. Generally, this implies that the Entity is not deeply or permanently physically affected, nor is it overall moved from one place to another.

Example: `hvashtam:7` (`hold:13 eng-30-01216670-v` 'have or hold in one's hands or grip')

- a) – hyponym: `stiskam:2` (`grasp:3` 'hold firmly')
- b) – hyponym: `pritiskam se:1` (`clutch:4` 'hold firmly, usually with one's hands')
- c) – hyponym: `lyuleya:3` (`cradle:2` 'hold gently and carefully')
- d) – hyponym: `sklyuchvam:6` (`interlace:2` 'hold in a locking position')
- e) – hyponym: `ulavyam` (`trap:4` 'hold or catch as if in a trap')

restrictions specified for the core FEs: for some verbs the Agent is a volitional human being corresponding to the WN root synset `person:1` (`eng-30-00007846-n`), e.g. (2b), (2d), while in other cases the verbs may allow their Agent to be an animal (2a), (2b), corresponding to the WN root synset `animal:1` (`eng-30-08660339-n`) or FE Body part, corresponding to (`body part:1 eng-30-03183080-n`), as in (2e). The restrictions on the FE Entity also are not consistent in all the discussed members of the tree – Entity may be either an animate (2g) or an inanimate physical object (2d)



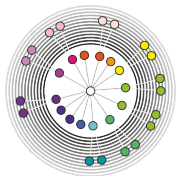
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Verbs of Contact by Impact

Verbs assigned the FrameNet frames:

- **Impact** : While in motion, an Impactor makes sudden, forcible contact with the Impactee, or two Impactors both move, mutually making forcible contact
- **Destroying**: A Destroyer (a conscious entity) or Cause (an event, or an entity involved in such an event) affects the Patient negatively so that the Patient no longer exists.

Their core FEs share similar general semantic characteristics, so no more specific selectional restrictions can be defined – the Impactor and the Impactee may be physical entities or eventualities, devices or persons



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VC by Impact – the FN frame Impact

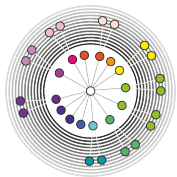
verbs belonging to the WN subtree stemming from hit:13, eng-30-01236164-v 'hit against; come into sudden contact with' which are assigned the FN frame Impact.

udryam:6 (smash:9 eng-30-00126236-n 'collide or strike violently and suddenly')

– hyponym: sblaskvam (shock:6 'collide violently') (b)

– hyponym: razbivam se: 2 (crash:6 'undergo damage or destruction on impact')

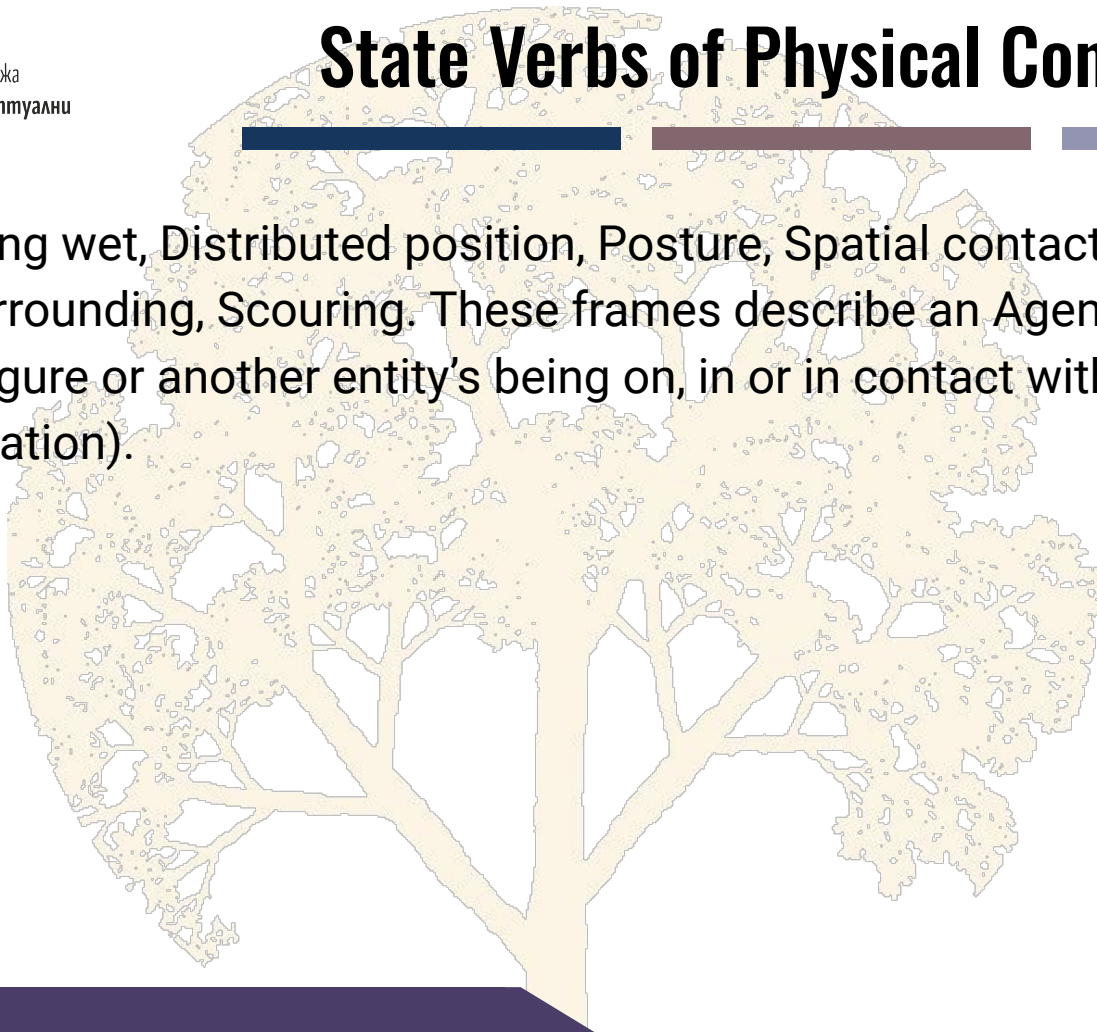
The verbs in this group impose less rigid restrictions on their FEs – the Impactor and the Impactee correspond to physical entities.

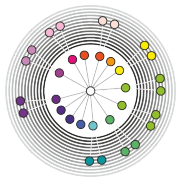


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State Verbs of Physical Contact

FN frames: Being wet, Distributed position, Posture, Spatial contact, Surrendering possession, Surrounding, Scouring. These frames describe an Agent (Protagonist), Item, Theme, Figure or another entity's being on, in or in contact with an area or a substance (Location).





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State Verbs of Physical Contact

Example *lezha:3* (*lie:2* 'be lying, be prostrate; be in a horizontal position' FN frame Posture: An Agent supports their body in a particular Location. The LUs of the frame convey which body part is the Point of contact where the Agent is supported, what orientation the body is in, and some overall arrangement of the limbs (especially the legs) and the torso.

(a) hyponym: *peka se :1* (*sunbathe:1* 'expose one's body to the sun')

(b) hyponym: *iztyagam se:1* (*sprawl:1* 'sit or lie with one's limbs spread out')

(c) hyponym: *izlyagam se:1* (*recumb:1* 'lean in a comfortable resting position')

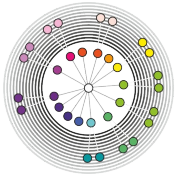
(d) hyponym: *pokrivam:1* (*overlie:2* 'lie upon; lie on top of')

(e) hyponym: *lezha buden:1* (*lie awake:1* 'lie without sleeping')

(f) hyponym: *pochivam:3* (*repose:6* 'lie when dead')

(g) hyponym: *pripicham se:1* (*bask:1* 'be exposed')

selectional restrictions on Agent: for some of them it may be a volitional human being corresponding to the WN root synset *person:1* (*eng-30-00007846-n*) (4e), (4f) as well as an animal (4a), (4b), (4c), (4d), (4g), aligned with the WN root synset *animal:1* (*eng-30-08660339-n*).



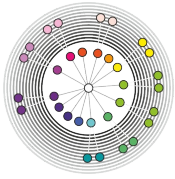
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Verbs of Perception 1

In linguistic literature, perception verbs are traditionally divided into groups depending on the involvement of a certain sense organ:

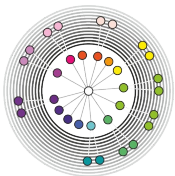
- visual
- auditory
- tactile
- olfactory
- taste perception.

[Viberg 1983; Vezhbitskaya 1986: 338].



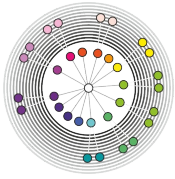
Verbs of Perception 2

- The verbs from each of these groups outline situations in which the perceiving participant (the experiencer) processes a given external stimulus (object or situation) with the help of a given sense organ [Verhoeven 2007: 49].
- From a syntactic point of view, perception verbs are divided into subject-experiencer verbs (*smell, feel*) and subject-stimulus verbs (look, sound). On the other hand, verbs with subject-experiencer can describe volitional (*listen, look*) or spontaneous perception (*see, hear*), cf. [Viberg 2001: 1296].



Perception_active frame

- @Framenet Definition: The frame contains perception verbs, whose perceivers voluntarily direct their attention to some entity or phenomenon for the purpose of perceptual experience.
- The perceiver is active and his role in this frame is **Perceiver_agentive**.
- The core frame elements (FE) are the **Perceiver_agentive**, who performs a certain volitional activity in order to have a perception experience, and the **Phenomenon** - the entity to which the Perceiver directs his attention. Usually the Perceiver_agentive is expressed with an external argument, and the Phenomenon - with an object.

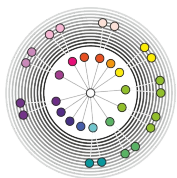


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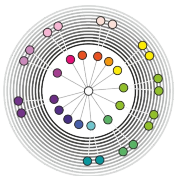
Unexpressed core elements of Perception_active

- **Body_part.** This element marks the sensory organ used by the Perceiver_agentive and is usually expressed by a PP.
 - (1) *Пробвай водата с пръстчетата на крака, преди да влезеш.*

This frame element appears inconsistently within the frame, as most perception verbs contain the used part of the body implicitly. For example, visual perception is necessarily related to the organs of vision. It is usually found with verbs for tactile perception, which do not imply which part of the body is used.
 - (2) *Взрях се в капитана със здравето си око.*
- **Direction** is used to denote expressions describing how the attention of the recipient is directed during the act of perception, excluding those which name Location_of_perceiver.
 - (3) *Осъзнаваше, че Кабраксис го наблюдава през прозореца на каретата.*



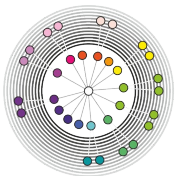
Core FE	Definition	Semantic restrictions	Syntactic category	Syntactic function	Possible prepositions (linking words)
Perceiver_agentive	A person or other animate entity, who with the help of the senses <u>perceives</u> consciously and <u>controlledly</u> objects or events; the focus is voluntarily directed to a specific source.	Animacy (+) Consciousness (+) Internal control (+)	NP	Subject	–
Phenomenon	An object or event that is perceived by the perceiver.	Animacy (+/-) Eventivity (+/-) Concreteness (+) Abstractness (-) State of affairs (+/-)	NP PP S	Object, Adverbial, Clause	В, ВЪВ, КЪМ



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Core FE 2

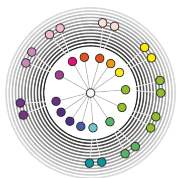
Body_part <input type="checkbox"/>	A part of the body that is directly involved in perception without undergoing a change.	Concreteness (+) Animacy (+) Body part (+)	NP	Adverbial	С, със
Direction	A place, a spatial point, or sequence of spatial points that describes the trajectory of the perceiver's attention.	Location (+) Concreteness (+)	NP	Adverbial	В, във, към, през (there can be an adverb instead of an object - напред, назад)



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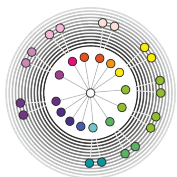
Perception_experience frame

- @Framenet Definition: The frame describes perception verbs whose perceiver experiences the act of perception without necessarily intending to do so. For this reason, the perceiver within this frame is called *Perceiver_passive*. The frame also includes lexical units that are not related to a specific type of perception and which are categorised as general perception: *усещам:3*, *усетя:4*, *чувствам:4*, *почуствам:4*, *улавям:1*, *уловя:1*, *долавям:1*, *доловя:1*.
- There are cases in which higher verbs in the hierarchy can replace lower positioned verbs, we also observe specification through the type of Phenomenon or the organ of perception, and in some cases - both. Using this specification we found that *усещам:3*, *усетя:4*, *чувствам:4*, *почуствам:4* literals are found mainly in terms of gustatory and olfactory perception.
*Отново усещаше **аромата** на мъх и папрати, на дърветата в гората.*



Arguments and Disambiguation

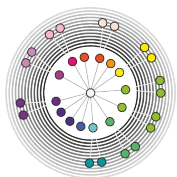
- Whereas *улавям:1, уловя:1, долавям:1, доловя:1 (catch:26, pick up:12)* cover all types of perception with the exception of tactile sense.
 - (4) *С ъгълчето на окото **долови** някакво движение.*
 - (5) *Патрицията **долови** разговор.*
 - (6) *Докато я търсеше, **долови** далечен звук и ушите му щръкнаха.*
 - (7) *Носът му **долови** миризмата на храна.*
 - (8) *Дали рецепторите ми не са толкова изтънчени, колкото се предполага, но не **долових** вкуса на кокоса в общото съчетание.*



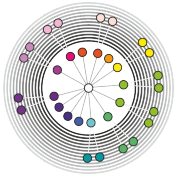
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Core frame elements of Perception_experience frame

- **Body_part** - the place in the body of the Perceiver_passive in which the perceptual experience takes place. It is usually syntactically expressed by a PP. (9) *Тя усети на врата си студеното докосване на перата по бузата му, а после топлината на устните му върху мекото на ушите си.*
Unspecified types of perception often represent this frame element because the perception is not localised in a specific part of the body. It is possible that it is expressed in more specific types of perception. (10) *Усетил си вкуса на гроздовите зърна с небцето си.*
- In the case of verbs that are ambiguous in terms of active-passive perception, the use of this FE distinguishes between the two types. (11) *Той мина бързо край купчината развалини и подуши с нос.*
- **Perceiver_passive** indicates the subject of perception, not necessarily consciously aimed at it. It is usually syntactically expressed with an external argument. (12) *Дори от такова голямо разстояние Кара можеше да надуши апетитното им уханье.*
- **Phenomenon** - marks the entity or stimulus that the perceiver experiences with their senses. It is usually in the position of a direct object. (13) *Но скоро видяхме едно много забележително чудовище.*

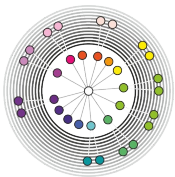


Core FE	Definition	Semantic restrictions	Syntactic category	Syntactic function	Possible prepositions (linking words)
Perceiver_passive	A person or other animate being who perceives elements of the world around him; the perception takes place without conscious control.	Animacy (+) Consciousness (+) Internal control (-)	NP	Subject	—
Phenomenon	An object or event that is perceived by the <u>percipient</u> .	Animacy(+/-) Eventivity (+/-) Concreteness (+) Abstractness (-) State of affairs (+/-)	NP S	Object, Clause	
Body_part	Part of the body with the help of which the perception is performed or which directly	Concreteness (+) Animacy (+) Body part (+)	PP	Adverbial	С, със, на, върху



Perception_body frame

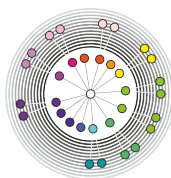
- @Framenet **Definition:** This frame contains words describing physical experiences that can affect any part of the body. The corresponding part of the body is almost always explicitly named, traditionally with the help of an external argument. At the sentence level, the Experiencer in Bulgarian language can be coded as an accusative (*главата ме боли*), dative (*възглавницата ми убива*) and possessive (*обажда ми се гастритът*). In rare cases, the Experiencer is expressed with an external argument, and the FE Body_part - as an object (*имам болки в цялото тяло*).
- (14) *Ръцете и краката го боляха, в началото леко, после болката стана все по-силна, накрая — непоносима, като в същото време гласовете добиваха все по-голяма яснота.*



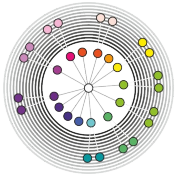
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Perception_body frame - core FE

- **Body_part** - this frame element names the location within the body where the physical experience takes place, usually expressed by an external argument or a PP.
(15) *Нещо го **бодеше** между ребрата. Дръжката на меча му.*
(16) *Орязаната ѝ коса **бодеше** брадичката ми и единственото нещо, за което можеш да мисля, бе колко много я обичам.*
- **Experiencer** - Experiencer is the animate entity who experiences physical sensation - internally or externally in a part of the body.

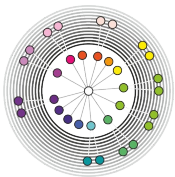


Core FE	Definition	Semantic restrictions	Syntactic category	Syntactic function	Possible prepositions (linking words)
Experiencer	An <u>animate</u> participant in the situation who experiences physical sensation.	Animacy (+) Consciousness (+) Internal control (-)	NP	Subject, Object	
Body_part	A part of the body that names a specific area of physical sensation without undergoing a change.	Concreteness (+) Animacy (+) Body part (+)	NP, PP	Subject, Object	В, под



Scrutiny

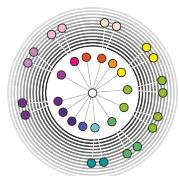
- **@Framenet Definition:** This frame deals with situations in which the Cognizer is an animate or intelligent entity who pays attention to the Ground in order to detect or note an inherent feature of the object. The Cognizer may be interested in a certain characteristic or entity, the Phenomenon that is part of the Ground or contained in the Ground (or to make sure that such a feature or entity is not present).



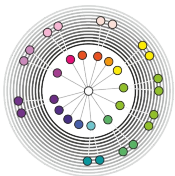
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Scrutiny - core FE

- **Cognizer** - carefully studies a certain entity in order to discover something about it. This frame element is usually represented by an external argument.
(17) *Таргон **прегледа** доклада набързо.*
- **Ground** - the medium which serves as a background or a context of the Phenomenon.
(18) *Тя с професионално око **оглеждаше влажния тунел** [GROUND] за пукнатини [PHENOMENON].*
- **Instrument** - an entity that the Cognizer uses and directs and that interacts with the background to accomplish the scrutiny.
(19) *Техникът **инспектира машината с лазерен нивелир**.*
- **Medium** - a part of a text or work on which the attention of the Cognizer is focused in order to find some information. It is usually expressed by an external argument.
(20) ***Втора глава** разглежда Ръселовата философия в контекста на дилемата.*



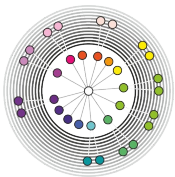
Core FE	Definition	Semantic restrictions	Syntactic category	Syntactic function	Possible prepositions (linking words)
Cognizer	An animate or quasi-animate entity, most often a person who performs a cognitive or mental activity in order to establish or discover a certain fact or knowledge, to form an opinion or attitude.	Animacy (+) Organisation (+/-) Consciousness (+) Internal control (+/-)	NP	Subject	—
Ground	An object or place in the context in which the Phenomenon occurs or can be noticed.	Location (+)	NP	Object	



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Core FE 2

Instrument	Physical entity, most often a special device that is used as an aid by the Cognizer to realise perception.	Concreteness (+) Solid body (+)	PP	Indirect object	C, със
Medium	A physical or abstract entity, most often a piece of artefact, text or work, containing the information sought by the Cognizer.	Concreteness (+/-) Abstractness (+/-)	NP	Subject	-



Cause_to_perceive

- @Framenet **Definition**: An Agent, Actor, Entity or Medium causes a Phenomenon to be perceived by a Perceiver. The Perceiver is usually unspecified if an Actor, Entity or Medium is present.

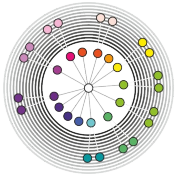
(21) Тя [ACTOR] **демонстрира интерес** към **изложените картини** [PHENOMENON].

(22) Единствено на Фродо [PERCEIVER] (той) [AGENT] **показвал книгата** [PHENOMENON] за пътешествието, която пишел.

(23) **Сцената** [MEDIUM] **представя** „бърлогата“ [PHENOMENON] на полковник Калун, събрал на малък гуляй неколцина от съседите си плантатори.

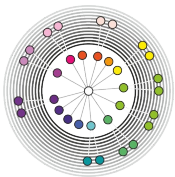
(24) Сателитните снимки **показват**, че всичко е чисто.

(25) **Икономиката** [ENTITY] **показва признаци** на възстановяване [PHENOMENON].



Give_impression

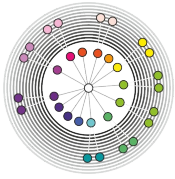
- @Framenet **Definition:** This class of perception predicates presents the Phenomenon, which is typically expressed by an external argument, and its perceptual characteristics are given a specific description. This can be Characterization, describing purely perceptual properties, Appraisal, giving information about a positive or negative evaluation, or Inference concerning a non-perceptual property based on the Perceiver_passive's opinion.



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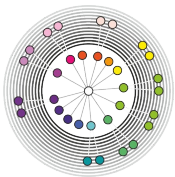
Give_impression - core FE

- **Appraisal** - a positive or negative judgement, given to the Phenomenon.
(26) *Гласът ми звучеше ужасно — сякаш бях плакал за нещо.*
- **Characterization** - a subjective description of the Phenomenon, made by the Perceiver_passive.
(27) *Ярката боя по фасадата му изглеждаше някак сивкава и безжизнена.*
- **Inference** - expresses a certain quality of the Phenomenon, which is not directly related to the specific sensory modality, but is based on perception within this type.
(28) *Звучиш разочарована от новината.*
- **Phenomenon** - is typically expressed as an external argument of the verbs in the considered frame.
(29) *Гласовете звучаха гръмка и съвсем наблизно.*



Make_noise

- **@Framenet Definition:** A physical entity called the Sound_source emits Sound. This includes humans and animals that make sounds with their vocal organs. The frame does not include situations where the sound extraction is the result of contact with objects (collision or friction). Cases in which an animate Agent or natural force causes sound extraction are considered in the **Cause_to_make_noise** frame.



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Make_noise - core FE

- **Noisy_event** - an event involving one or more **Sound_sources** and is accompanied by **Sound**.

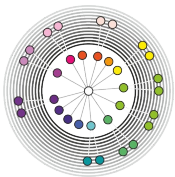
(30) *Караниците [NOISY_EVENT] кънтяха из целия квартал.*

- **Sound** - the frame element is very often incorporated in the meaning of the verbs to which the frame is ascribed. Otherwise it is assigned an NP.

(31) *Ехтеше и ехтеше адският звук, отекваше през виещите хълмове и над водите на Люлката на Нага, разбиваше се в планините на Голям Уик и се връщаше, ехтеше и ехтеше, докато не изпълни целия мокър свят.*

- **Sound_source** - attributed to a constituent naming the physical entity that emits the sound (e.g. machine, musical instrument).

(32) *В далечината шумеше тракторът.*



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Thank you for your attention!

Maria Todorova

Hristina Kukova

Institute for Bulgarian Language „Проф. Любомир Андрейчин“

maria@dcl.bas.bg

hristina@dcl.bas.bg

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