



The Kicktionary Revisited

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This talk...

- ... about **ideas** for **building** a multilingual lexical resource of football language...
- ... in a **web-based** environment...
- ... involving **many** contributors...
- ... departing from an **existing** multilingual lexical resource of football language...
- ... **built** by **one** contributor

www.kicktionary.de

- A multilingual (German – English – French) dictionary of football language
- For human users
- Based on corpus material (after-match reports from uefa.com and kicker.de)
- Using FrameNet ideas for example sentence annotation
- Using FrameNet and WordNet ideas for higher level structuring of lexical units

Scene: ONE-ON-ONE

PLAYER_WITH_BALL

OPPONENT_PLAYER

BALL

LOCATION



CHALLENGE

B challenges **A**

B makes a challenge for **A**

B tackles **A**

TAKE ON

A takes on **B**

A is under pressure from **B**

DENY

B denies **A**

B dispossesses **A**

BEAT

A beats **B**

A nutmegs **B**

A rounds **B**

Scene: ONE-ON-ONE

PLAYER_WITH_BALL

OPPONENT_PLAYER

BALL

LOCATION



CHALLENGE

B stört **A**

B bedrängt **A**

B attackiert **A**

TAKE ON

A défie **B**

A est sous la pression de **B**

DENY

B dépossède **A**

B grätscht **A** ab

BEAT

A düpiert **B**

A tunnelt **B**

A umdribbelt **B**

Semantic Relations

Synonymy

match – encounter Strafraum – Sechzehner but – cage
centre – cross legen – fällen frapper – tirer

Translation equivalence

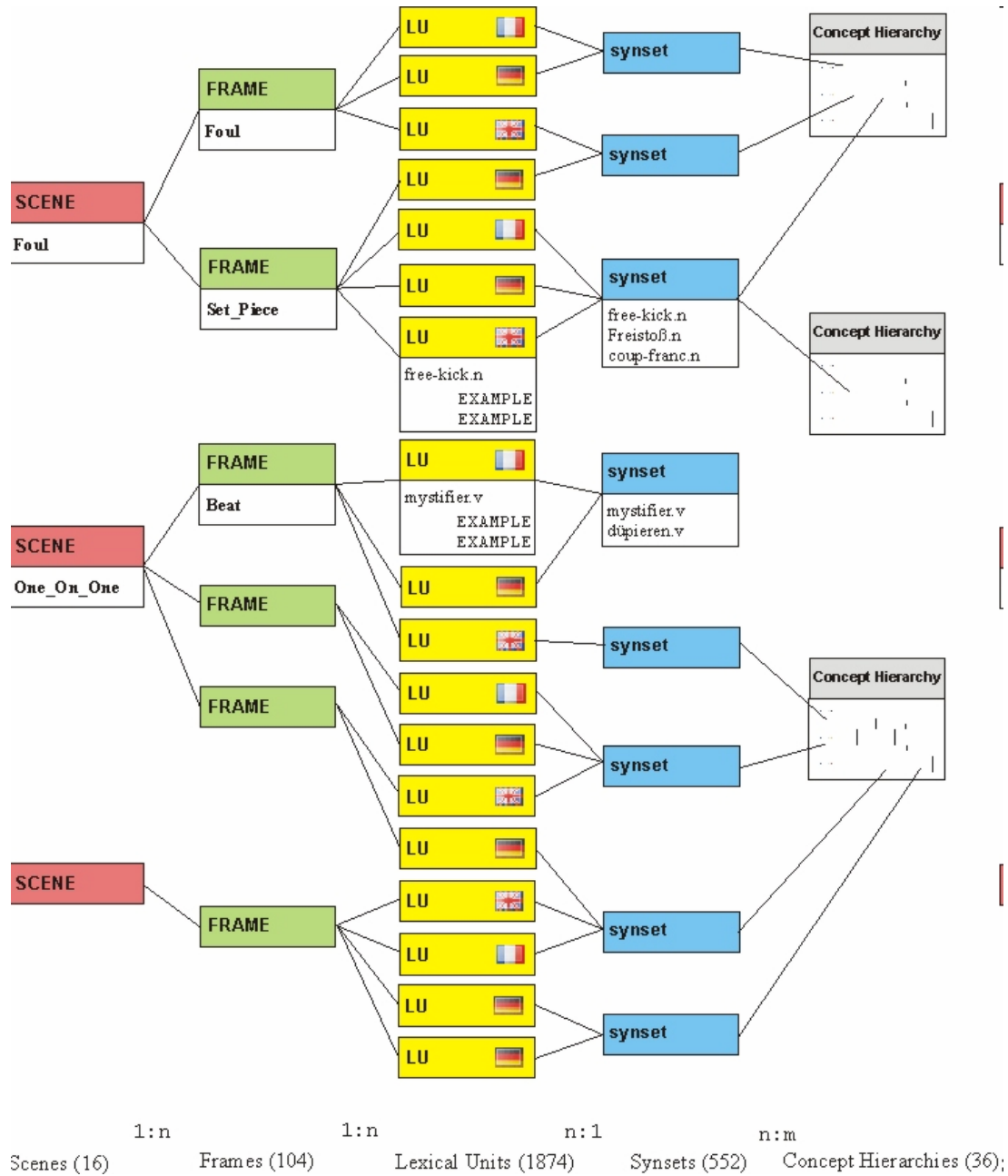
goal – Tor – but schießen – shoot - tirer

Hyponymy/Hypernymy

player
 defender
 centre-back
 striker

Holonymy/Meronymy

Spielfeld
 Hälfte
 Sechzehner
 Torraum





Dictionary

- [Lexical Units](#)
- [Scenes](#)
- [Concept Hierarchies](#)
- [Sound Examples](#)
- [Parallel Texts](#)

drill (verb)

Scene [Shot](#) Frame [Shot](#)

Examples

- [Henry]_{SHOOTER} cut inside from the right and laid the ball in to Ljungberg inside the penalty area, collecting the Swede's back-heeled return to **drill** [into the corner of the net]_{TARGET}. [1077218 / p6]
- Poland's seventh came five minutes before the end when Tomasz Rzasca again exploited the visitors weak right side and cut back to substitute [Marek Saganowski]_{SHOOTER} who spun in the area before **drilling** [the ball]_{BALL} [home]_{TARGET}. [75339 / p8]
- In the final minutes of the opening period Simão, Petit and Nuno Assis all took turns to try to level the score with audacious efforts from distance while CSKA's only attempt of note during this period fell to [Rolan Gusev]_{SHOOTER}, who also **drilled** [wide]_{TARGET} [from long range]_{SOURCE}. [79954 / p6]
- Krzynówek deservedly scored himself on 72 minutes, when [he]_{SHOOTER} came off the left wing and **drilled** [high]_{PATH} [past Kramarenko]_{TARGET} [from the angle of the area]_{SOURCE}. [75339 / p7]

Semantic relations

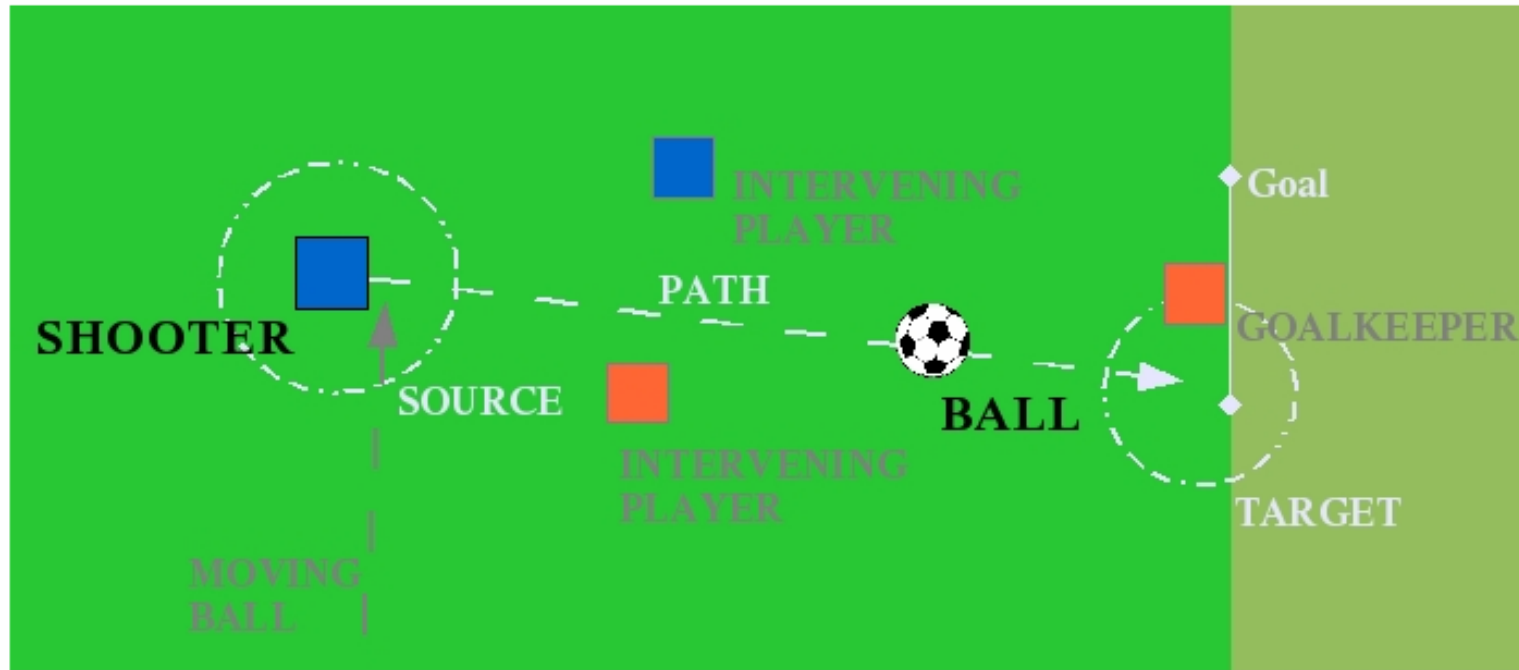
Synonyms	hämmern jagen knallen dreschen
	blast fire rifle drill catapult propulser
Troponyms [Move_Ball]	draufhalten.v abziehen.v schießen.v
	kick.v shoot.v
	shooter.v tiner.v frapper.v

Frame elements

BALL [Ball] **PATH** [On_The_Field_Location] **SHOOTER** [Player] **SOURCE** [On_The_Field_Location] **TARGET** [On_The_Field_Location]

LU	BALL	PATH	SHOOTER	SOURCE	TARGET
drill			Henry		into the corner of the ne...
drilling	the ball		Marek Saganowski		home
drilled			Rolan Gusev	from long range	wide
drilled		high	he	from the angle of the are...	past Kramarenko

A shot



The Shot scenario is centered around the event of a player directing the ball to a target on the field. Typically, the target is the opponent's goal, and the shot is carried out in the intention of scoring a goal. The main protagonist of the scenario is the **shooter**. Using a **part of his body**, the **shooter** directs the **ball** towards the opponent's goal. The **ball** moves from the **source** location on the field along a **path** to a **target** location. In some cases, the **moving ball** (typically a pass from a team-mate) that brought the **shooter** into a position to carry out the shot can be mentioned. Sometimes, a shot is construed as the final stage of a **move** by the **shooter's team**.

The frame **Shot** contains LUs which describe a shot from the shooter's point of view. The **Finish** frame contains LUs that construe a shot *as the last stage of a move* by the shooter's team.





Dictionary

- [Lexical Units](#)
- [Scenes](#)
- [Concept Hierarchies](#)
- [Sound Examples](#)
- [Parallel Texts](#)

Shot [Scene: Shot]

Lexical Units / Lexikalische Einheiten / Unités lexicales

-  abziehen Aufsetzer Bogenlampe bugsieren Direktabnahme Distanzschuss draufhalten Drehschuss dreschen Dropkick Fallrückzieher Fernschuss Flachschuss Flugkopfball Gewaltschuss Hackentrick Halbvolley Hammer hämmern Heber Hechtkopfball jagen knallen Knaller Kopfball Kopfball-Torpedo köpfen Kopfstoß Kracher lupfen Lupfer nicken Pfund Scherenschlag schießen schlenzen Schlenzer Schuss Sonntagsschuss spitzeln stochern Torschuss überlupfen Versuch Volley Volleykracher Volleyschuss Warnschuss Weitschuss zirkeln
-  attempt back-heel back-heel bend bicycle-kick blast chest chip curl diving_header drill drive effort fire flick glance half-volley head header kick lob lob loft long-range_shot low_shot nod overhead_kick poke rifle roll scissors_kick shoot shot side-foot snapshot strike thunderbolt toe-poke toe-poke volley volley warning_shot
-  boulet_de_canon brosser catapulter coup_de_tête demi-volée frappe_à_ras_de_terre frappe_avec_rebond frappe_brossée frappe_en_ciseau frappe_enroulée frappe_lointaine frappe frapper glisser lob loper missile pichenette piquer propulser reprise_de_volée retourné shooter talonnade talonner tentative tête_plongeante tête tir tirer volée

Frame elements / Frame-Elemente / Éléments de frame

1. SHOOTER
2. TARGET
3. SOURCE
4. BALL
5. PART_OF_BODY
6. MOVING_BALL
7. PATH
8. INTERVENING_PLAYER
9. RECIPIENT

Individual_Actors [Hypernymy]

Individual_Actor

Akteur.n Spieler.n

player.n

joueur.n

Keeper.n Schlussmann.n Torhüter.n Torwart.n

custodian.n goalkeeper.n keeper.n

gardien_de_but.n gardien.n portier.n

Feldspieler.n

Abwehrspieler.n Verteidiger.n

defender.n

arrière.n défenseur.n

Innenverteidiger.n

central_defender.n centre-back.n centre-half.n full-back.n

défenseur_central.n

Abräumer.n

sweeper.n

Libero.n

libero.n

Dictionary (# LUs)



Annotations (# Annotated Sentences)



Dictionary (# LUs)

Annotations (# Annotated Sentences)



599



2374



792



3551



535



2239

Additional corpus material:

- More corpus material for existing languages: after-match reports
- Different text type for existing languages: minute-by-minute reports
 - 4 times original corpus size
- Comparable material for other languages: Italian, Spanish, Portuguese (Russian, Japanese, Chinese)

Dictionary (# LUs)

Annotations (# Annotated Sentences)



→ Additional languages

→ Additional LUs

→ Additional annotated sentences

→ Additional contributors? „Crowdsourcing“?

Practical and Methodological Considerations

- Web-based environment
 - Central storage of corpus and dictionary
 - Add or edit content through a web browser interface
- Bottom-Up-Workflow
 - Practical reasons: **many** people adding basic building blocks (**simple**), **fewer** people managing higher level structures (**hard**)
 - Methodological reasons

Bottom-Up vs. Top-Down

- Top-Down: define a scene / a frame, „fill“ it with lexical units, annotate examples
- Bottom-Up: Collect (many) LUs with examples, structure them into frames/scenes

FrameNet proceeds frame by frame, not word by word. This may seem a trivial point, but it isn't. Although FrameNet uses empirical data, it does not use an empirical methodology.“

(Patrick Hanks)

Bottom-Up vs. Top-Down

Forced a priori decisions:

- Boundaries between scenes? *goal + kick-off*
- Assigning a LU to (only) one frame? *free-kick*
- Degree of abstraction?
 - Frames: „Volleying“, „Shooting“, „Move_Ball“, „Manipulate_Artefact“?
 - Frame Elements: „Volleyor“, „Shooter“, „Agent“?
- „Static“ nouns? *shinguard, by-line*

Theoretical problem: no „hard“ evidence

Practical problem: Additions on lower levels (new LUs, new examples) may require restructuring on higher levels (frames), restructuring on higher levels (frames) may require changes on lower levels (example annotation)

Bottom-Up-Workflow

- Take simple decisions (with local effects) first, postpone difficult decisions (with global effects) until enough (?) empirical material has been collected
- Some „hard“ evidence plus „pragmatic considerations“ (Navigability of the dictionary)
 - Balance / Symmetry of hierarchical structures
 - Homogeneity / Intuitiveness of higher level entities

Bottom-Up-Workflow

1. Identify a Lexical Unit
2. Define it
3. Select examples from the corpus

4. Establish synonymy and translation equivalence relations

5. Annotate examples

6. Organise LUs into scenes and frames

header

1. Identify a Lexical Unit

2. Define it

header

Act of hitting the ball with the head

3. Select examples

header

Act of hitting the ball with the head

Moments later, Vjatšeslav Zahovaiko came close to adding to Estonia's lead, sending a **header** from another Lindpere corner just wide. [\[75227 / p3\]](#)

Kristen Viikmäe drew an early save out of Akinfeev, but Russia remained dangerous and at the other end Vladimir Bystrov sent a **header** just over the crossbar . [\[75243 / p5\]](#)

After missing two chances earlier in the game, it was a case of third time lucky for Clinton Morrison, who met Damien Duff's left-wing cross to power a **header** past goalkeeper Nikos Panagiotou. [\[75266 / p4\]](#)

3. Select examples

to volley

A ball that is received and delivered without touching the ground

Kazakhstan captain Samat Smakov **volleyed** over the bar before Baltiev went close again just before half-time, shooting narrowly wide from the edge of the area. [\[75190 / p4\]](#)

First Omonia's Kekic saw his effort cleared off the line by Evgeni Iordanov, then Mujiri broke the offside trap only to shoot wide for CSKA before Kekic **volleyed** wide at the other end, all in the 52nd minute. [\[75223 / p4\]](#)

Kopfball

Ein mit dem Kopf ausgeführter Schuss

Acht Minuten vor Schluss der ersten Hälfte setzte Bogdani einen **Kopfball** am türkischen Gehäuse vorbei. [\[75199 / p4\]](#)

Ingemar Teevers **Kopfball** konnte von Ricardo pariert werden, bei der anschließenden Ecke unterlief Portugals Schlussmann allerdings den Ball, doch Costinha klärte Raio Pirojas Kopfball auf der Linie. [\[75228 / p4\]](#)

Slowenien hatte in der ersten Halbzeit eine große Chance zur Führung, als Gianluca Zambrotta einen **Kopfball** an die eigene Latte setzte. [\[75298 / p3\]](#)

Excursion: How many LUs?

- Kicktionary: **800** German LUs
 - Systematic gaps: league vs. cup competition
 - Gaps because of small corpus size (< 2.000.000 words)
- „PONS-Fußballwörterbuch“ (6 languages): Around **450** German LUs
- Burkhardt: „Wörterbuch der Fußballsprache“ (monolingual): **2.200** German LUs
- „Kauderwelsch Fußball“ (7 languages): **220** German LUs
- Langenscheidt Praxiswörterbuch Fußball (3 languages): **1752** German LUs
 - + Kartenvergabestrategie, anaerobe Energiebereitstellung
 - Fehlpass, Schwalbe, ausdribbeln



4. Establish synonymy

Kopfball = Kopfstoß
Volley = Direktabnahme

4. Establish translation equivalence

header = Kopfstoß
header = coup de tête
Volley = volley
to flick = bugsieren (?)

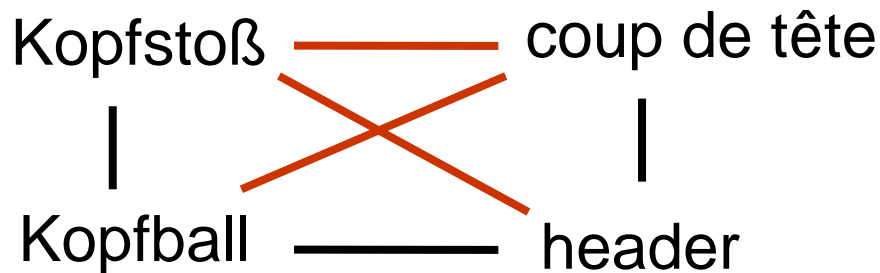
4. Establish synonymy

Kopfball = Kopfstoß
Volley = Direktabnahme

4. Establish translation equivalence

header = Kopfstoß
header = coup de tête
Volley = volley

(Exploit transitivity!)



Header

Act of hitting the ball with the head

Moments later, **Vjatšeslav Zahovaiko** came close to adding to Estonia's lead, sending a **header** from another Lindpere corner just **wide**. [\[75227 / p3\]](#)

Kristen Viikmäe drew an early save out of Akinfeev, but Russia remained dangerous and at the other end **Vladimir Bystrov** sent a **header just over the crossbar** . [\[75243 / p5\]](#)

After missing two chances earlier in the game, it was a case of third time lucky for **Clinton Morrison**, who met Damien Duff's left-wing cross to power a **header past goalkeeper Nikos Panagiotou**. [\[75266 / p4\]](#)

HEADING_PLAYER

HEADER_TARGET

to volley

A ball that is received and delivered without touching the ground

Kazakhstan captain Samat Smakov volleyed over the bar before Baltiev went close again just before half-time, shooting narrowly wide from the edge of the area. [\[75190 / p4\]](#)

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VOLLEYOR

VOLLEY_TARGET

Kopfball

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Slowenien hatte in der ersten Halbzeit eine große Chance zur Führung, als **Gianluca Zambrotta** einen **Kopfball an die eigene Latte** setzte. [\[75298 / p3\]](#)

KOPFBALLER

KOPFBALL_ZIEL

LUs and their annotations:

Vladimir Bystrov sent a **header** just over the crossbar.

HEADING_PLAYER

HEADER_TARGET

Samat Smakov volleyed over the bar

VOLLEYOR

VOLLEY_TARGET

Zambrotta setzte einen **Kopfball** an die eigene Latte

KOPFBALLER

KOPFBALL_ZIEL

LUs and their annotations:

Vladimir Bystrov sent a **header** **just over the crossbar**.

SHOOTER

TARGET

Samat Smakov **volleyed** **over the bar**

SHOOTER

TARGET

Zambrotta setzte einen **Kopfball** **an die eigene Latte**

SHOOTER

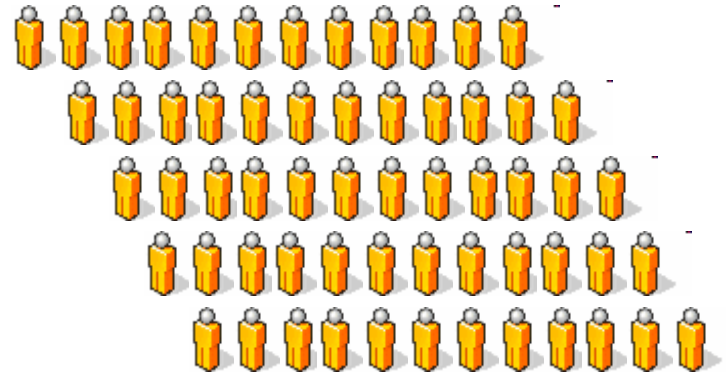
TARGET

Frames & Scenes = Abstractions over LUs and their annotations

- ✓ LUs share a common basic meaning
- ✓ LUs have comparable perspectives on some (abstract) event
- ✓ LUs allow for comparable sets of arguments
- ✓ Arguments exhibit similar semantic relations to one another

Level 0:

- Make a comment on an existing LU,
- Make a suggestion for a new entry

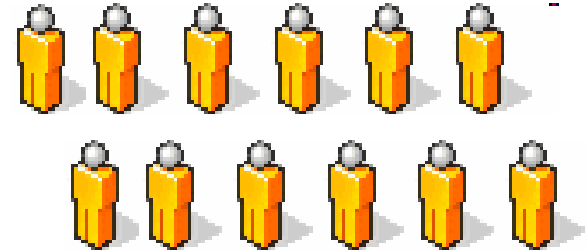


Level 1:

- Integrate a new LU into the resource
- Write a definition for a LU
- Select example sentences from the corpus

Level 2:

- Establish synonymy between LUs
- Establish translation equivalence between LUs

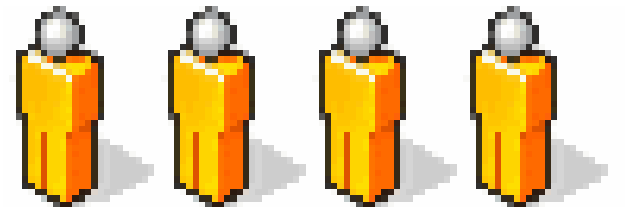


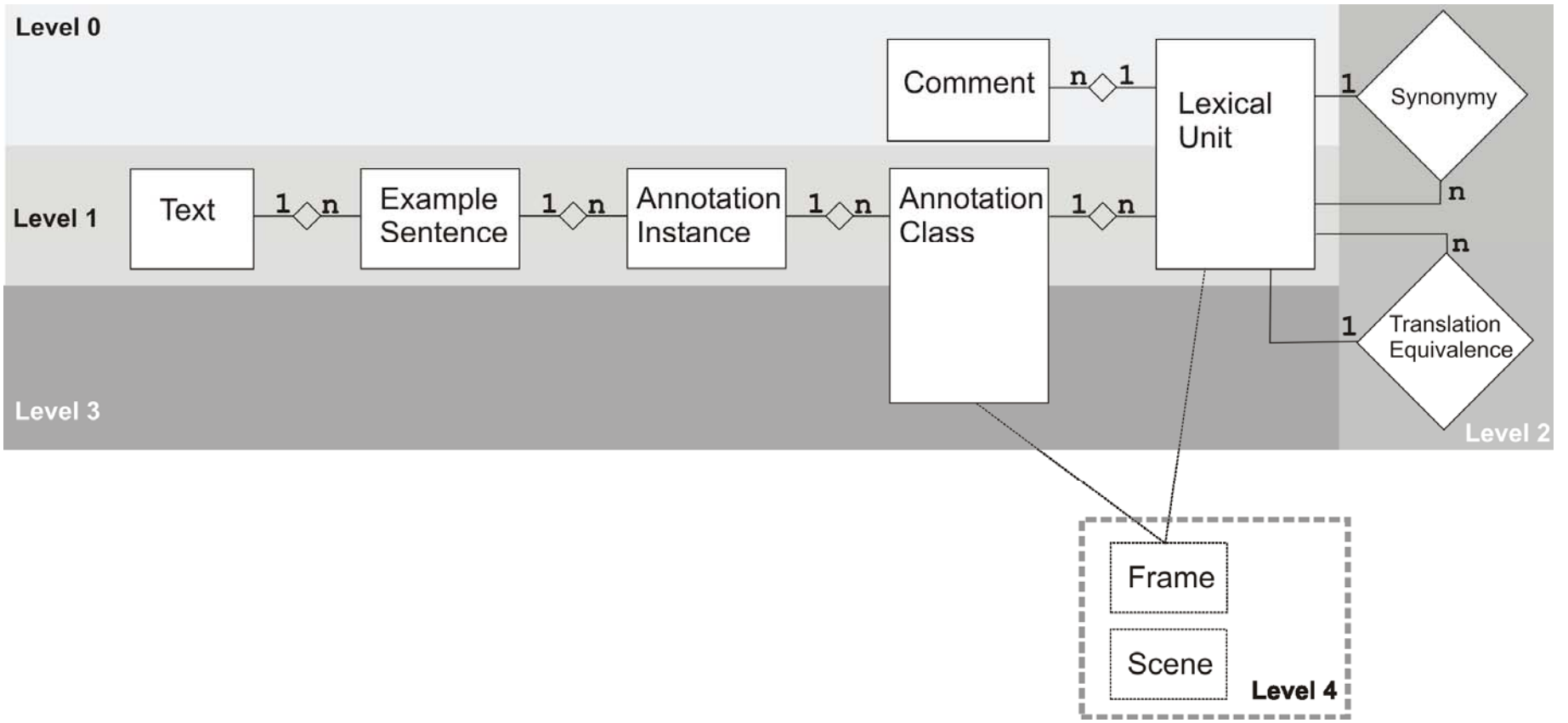
Level 3:

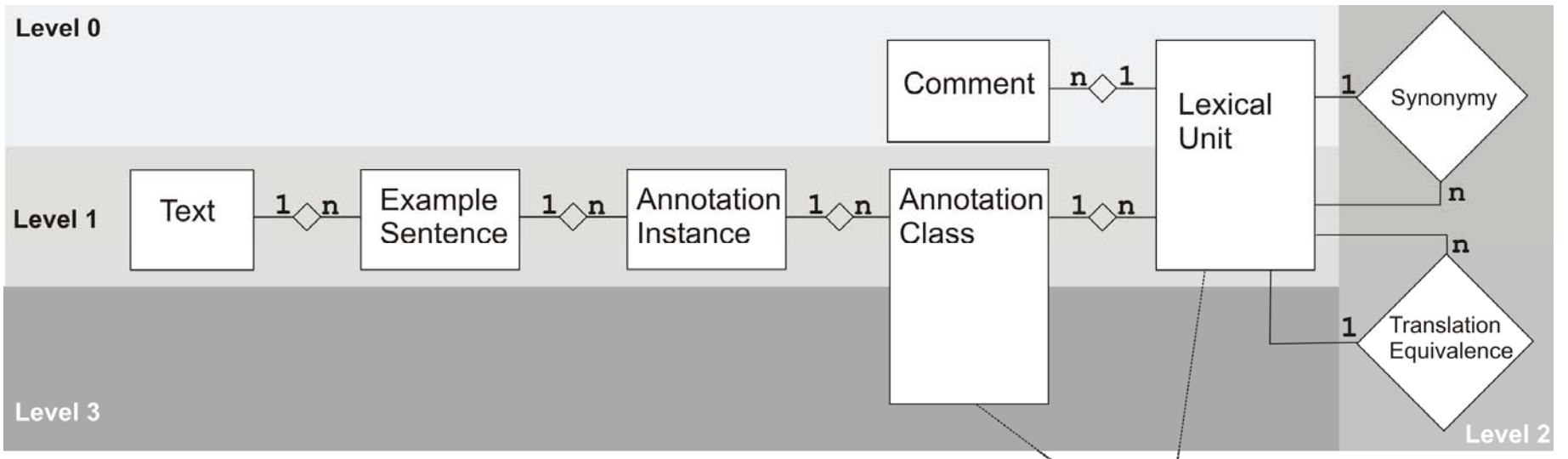
- Annotate example sentences

Level 4:

- Build Scenes and Frames







EXAMPLE SENTENCE

ID	Text	i ₁	i ₂	Text
S#1	TEXT#1	154	255	<i>Acht Minuten vor Schluß der ersten Hälfte setzte Bogdani einen Kopfball am türkischen Gehäuse vorbei.</i>

ANNOTATION CLASS

ID	Type	Value	LU
AC#1	Lexical_Unit	Kopfball	LU#1
AC#3	Argument	SHOOTER	LU#1
AC#4	Argument	TARGET	LU#1

ANNOTATION INSTANCE

ID	Sentence	i ₁	i ₂	Text	Class
AI#1	S#1	65	72	<i>Kopfball</i>	AC#1
AI#2	S#1	50	57	<i>Bogdani</i>	AC#3
AI#3	S#1	73	101	<i>am türkischen Gehäuse vorbei</i>	AC#4

LEXICAL UNIT

ID	Lemma
LU#1	Kopfball
LU#2	header
LU#3	Kopfstoß

SYNONYMY

LU1	LU2
LU#1	LU#3

TRANSLATION EQUIV

LU1	LU2
LU#1	LU#2



Search Expression: foul.*

Search

 Full Text Search Single Word Search

Parallel Corpus

EN-DE

Search Language

EN

75 results / 20s

Text	Element	Left context	Match	Right context	P
75139	p6	in Marotyán Vardanyán was dismissed for a professional	foul	on Pandev.	+
75142	p6	e, Mutu striking home from 22 metres after he had been	fouled	by Aleksandr Mitrevski.	+
75152	p4	et for Andorra 13 minutes in, but he was ruled to have	fouled	Dutch goalkeeper Edwin van der Sar in an aerial encoun	-
75186	p6	s scrambled effort was rightly ruled out after a clear	foul	on Rüstü.	-
75187	p7	On 55 minutes Necati Ates was	fouled	in the box, but Fatih Tekke's penalty was saved by sub	+
75223	p5	ender Christof Ritter was dismissed for a professional	foul	on Viikmäe.	+
75223	p8	ute into added time as midfielder Andreas Gerster	fouled	Lindpere and collected his second yellow card, having	+
75225	p6	Slovakia were unable to take advantage and a rash of	fouls	culminated in left-back Vratislav Gresko bringing down	-
75237	p7	aining after picking himself up following René Peters'	foul	.	-
75238	p4	ned level until the 57th minute, when Verpakovskis was	fouled	in the box by teenage defender Franz-Josef Vogt and Ze	-
75239	p8	Kerzhakov was	fouled	in the penalty area and Loskov stepped up to score the	+
75242	p3	Iain Sans pointed to the spot after Paulo Ferreira had	fouled	Ratislav Michalik.	-
75275	p4	utes, converting from the penalty spot after Duff was	fouled	by Julian Johnsson.	+
75278	p6	rant then introduced Swan - who within two minutes was	fouled	by Roy Keane, who followed Carr in receiving a yellow	+
75280	p5	tch with ten men following Panayotou's dismissal for a	foul	on the on-rushing Vonlanthen.	+
75341	p4	ight minutes later but the effort was disallowed for a	foul	.	+
75387	p2	Simek, who had been booked five minutes earlier for a	foul	on Marko Babic, was substituted shortly afterwards and	+
75397	p7	s sent off after picking up a second yellow card for a	foul	on Ljungberg.	+
75397	p9	Elin Topuzakov	fouled	substitute Christian Wilhelmsson in the penalty area a	+
79065	p4	After Stéphane Martine was	fouled	by Alfredas Skroblas, Sébastien Remy stepped up to tak	-
79065	p7	anas were reduced to ten men in added time after Majus	fouled	in the penalty box.	-

+ Context

- Context

Filter...

On 55 minutes Necati Ates was **fouled** in the box, but Fatih Tekke's penalty was saved by substitute keeper Andrey Morev, on for the injured Novikov who was rushed to hospital following the penalty incident.

Copy

EN

The floodgates threatened to open. On 55 minutes Necati Ates was fouled in the box, but Fatih Tekke's penalty was saved by substitute keeper Andrey Morev, on for the injured Novikov who was rushed to hospital following the penalty incident.

DE

Es schien, als sei die Gegenwehr der Gäste gebrochen. In der 55. Minute wurde Necati Ates im Strafraum zu Fall gebracht, aber der Elfmeter von Fatih Tekke konnte vom eingewechselten Torhüter Andrey Morev, der für den in dieser Szene verletzten Novikov kam, gehalten werden.

FEs: OFFENSE OFFENDER AREA OFFENDED_PLAYER

Substitute Nilmar was fouled by Frank Fahrenhorst , and Berthod slotted in the resulting penalty to...
Ekranas were reduced to ten men in added time after Majus fouled in the penalty box....
After Stéphane Martine was fouled by Alfredas Skroblas, Sébastian Remy stepped up to take the penalt...
Elin Topuzakov fouled substitute Christian Wilhelmsson in the penalty area and the Arsenal FC mid...
On 55 minutes Necati Ates was fouled in the box , but Fatih Tekke's penalty was saved by substitut...
Jan Kromkamp fouled Zbigniew Grzybowski just inside the area and Jacek Dembinski sent Henk Timmer...

Pa...

Cut

Substitute Nilmar was fouled by Frank Fahrenhorst
, and Berthod slotted in the resulting penalty to put the final seal on a devastating display.

Substitute Nilmar was fouled by Frank Fahrenhorst
, and Berthod slotted in the resulting penalty to put the final seal on a devastating display.

LU

Support

New FE

OFFENDED_PLAYER

AREA

OFFENDER

OFFENSE

Kopfball

Aber van der Sar war bei einem **Kopfball** von Aleksandar Bajeovski auf dem Posten.

Nach einem Eckball von Kapitän Mark van Bommel kam Philip Cocu zum **Kopfball**.

Acht Minuten vor Schluss der ersten Hälfte setzte Bogdani einen **Kopfball** am türkischen Gehäuse vorbei.

Ingemar Teevers **Kopfball** konnte von Ricardo pariert werden.

Header

Vjatšeslav Zahovaiko came close to adding to Estonia's lead, sending a **header** from another Lindpere corner just wide.

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Clinton Morrison met Damien Duff's left-wing cross to power a **header** past goalkeeper Nikos Panagiotou.

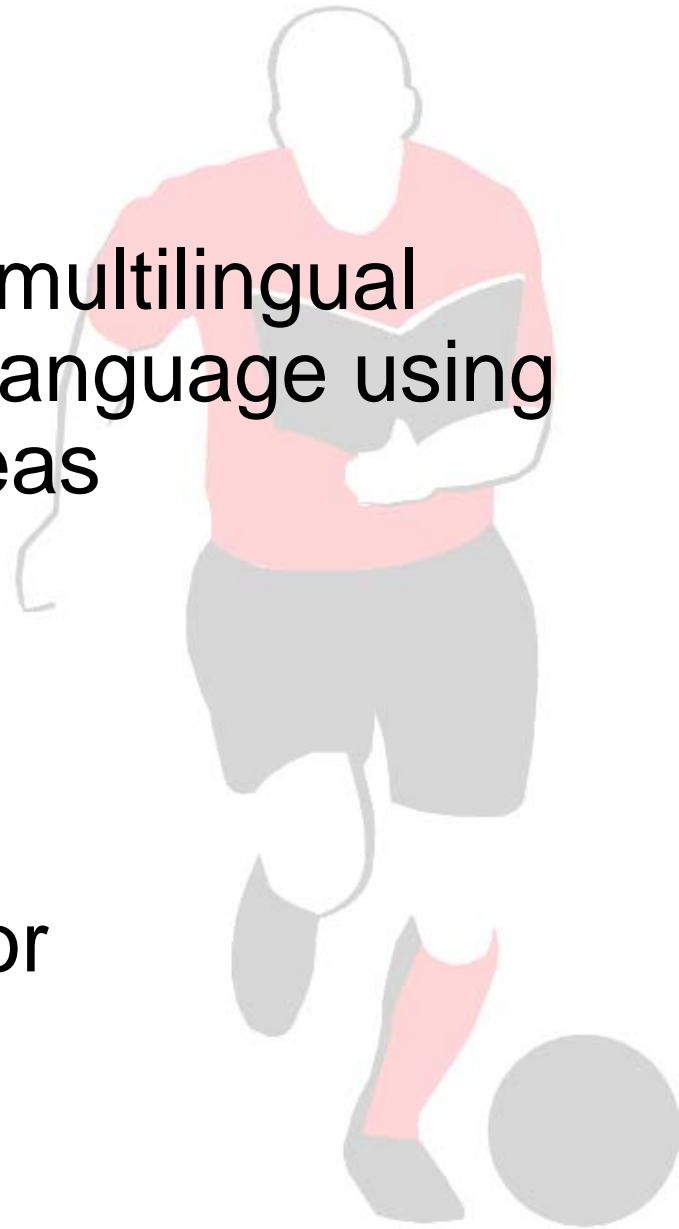
Kilbane went close to giving Ireland the lead glancing a **header** wide from Finnan's cross.

Confirm equivalence

Contest equivalence

Summary

- Ideas for crowd sourcing a multilingual lexical resource of football language using FrameNet and WordNet ideas
 - In a web-based environment
 - In a bottom-up workflow
 - Practical arguments
 - Methodological arguments
- Some first considerations for implementation



FrameNet proceeds frame by frame, not word by word. This may seem a trivial point, but it isn't. Although FrameNet uses empirical data, it does not use an empirical methodology. The methodology is that FrameNetters first think up a frame, then try to think of all the words that might fit into that frame, then go and annotate some of the corpus evidence for those words. This methodology creates two problems. Firstly, FN occasionally misses an important member of a frame (because the annotators did not think of it). Secondly, in quite a high proportion of cases FN currently does not cover all senses of a word (because "we haven't got to that Frame yet") and in some cases ("spoil", v., is one example) misses all major senses of the word and covers only minor senses.

Patrick Hanks,

<http://tech.groups.yahoo.com/group/lexicographylist/message/3178>

If Agent is more generic than Healer, then it seems to me that there is an imbalance in the FrameNet analyses of these sentences:

John [[Healer]] treated Mary with antibiotics.

John [[Agent]] treated the woodwork with creosote.

The second of these sentences should have been given a frame that is more specific than simply Agent, to match the level of specificity in the first example. Or else John should be called an Agent in both cases.

To follow this to its logical extreme, shouldn't each agentive verb -- and each sense of each verb -- have its own specific type of agent? How about these examples?

John [[stumbler]] stumbled over a root.

John [[drinker]] drank a cup of coffee.

et cetera

David Frank,

<http://tech.groups.yahoo.com/group/lexicographylist/message/3163>

“[i]n the early papers on Frame Semantics, a distinction is drawn between scene and frame, the former being a cognitive, conceptual, or experiential entity and the latter being a linguistic one [...]. In later works, scene ceases to be used and a frame is a cognitive structuring device, parts of which are indexed by words associated with it and used in the service of understanding [...].”

Petruck, 1996

- FrameNet (e.g. Ruppenhofer et al. 2006):
scenario, background frame, non-lexical frame, non-perspectivized frame
- Kicktionary:
scene (conceptual entity) vs. *frame* (linguistic entity)

“[...] we do not annotate many nouns denoting artefacts and natural kinds [...]. In this area, we mostly defer to WordNet [...].”

Ruppenhofer et al. 2006: §1.1.

“I think that semantic theory must reject the suggestion that all meanings need to be described in the same terms. I think, in fact, that semantic domains are going to differ from each other according to the kind of 'definitional base' which is most appropriate to them.”

Fillmore 1978

Dictionary



Scene



Frame



LU

Flick_On [Scenario: Pass]

1. RECIPIENT
2. PASS
3. SECOND_RECIPIENT
4. BALL
5. PART_OF_BODY
6. DIRECTION
7. FLICK_ON_TARGET

*	1	2	3	4	5	6	7
verlängern.v	■	■	■	■	■	■	■
Verlängerung.n	■	■	■	■	■	■	■
weiterleiten.v	■	■	■	■	■	■	■
flick_on.n	■	■	■	■	■	■	■
flick_on.v	■	■	■	■	■	■	■
touch_on.v	■	■	■	■	■	■	■
prolonger.v	■	■	■	■	■	■	■

Balanced: 10 Scenes à 10 Frames à 10 LUs

Unbalanced: 1 Scene à 240 Frames à 4 LUs

Symmetric: #frames per scene, #LUs per frame varies little

Asymmetric: #frames per scene, #LUs per frame varies much

Homogeneous: LU/Frame Element matrix is filled uniformly