

Intensity, Pitch, Duration and Focus

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This paper presents an investigation of the acoustic correlates of the semantic phenomenon of focus.

Focus

By the term focus roughly the following phenomenon is intended. In a normal declarative sentence what is asserted by the sentence can be controlled by a change of stress. Consider the following examples, where the word that is stressed is italicized.

- (1) Bill came here in a car.
- (2) *Bill* came here in a car.
- (3) Bill came here in a *car*.

The same effect can be achieved syntactically by clefting.

- (4) It was *Bill* who came here in a car.
- (5) It was a car *Bill* came here in.

In (1) we are asserting about Bill that he came here in a car. In (2) and (3) something different is asserted; in (2) we know that someone came here: what is asserted is that it was Bill, in (3) we know that Bill came here in some fashion and assert that it was in a car. A good way to convince oneself that assertion really is tied to stress and is different in (1), (2) and (3) is to negate the sentences. One then becomes aware that the force of the negation is dependent on what element of the sentence is asserted. The element that is asserted is the element in *focus*, everything else in the sentence will be referred to as the *background*.

Focus is not restricted to declarative sentences as can be seen by the following two sentences.

- (6) Walk to London!
- (7) Did you walk to London?

Our use of the term focus corresponds to that of Chomsky (1972) who however, uses the term presupposition for what we call background.

The acoustics of focus

When it comes to correlating phonetic phenomena with focus acoustic phenomena might a priori seem less relevant than phenomena of production and perception. This is correct, but it can be said that because acoustic information is more easily available and our knowledge of the relation between focus and acoustic phenomena is relatively incomplete an investigation of the acoustics of focus would both be practical and desirable. The following acoustic parameters have been investigated: duration, intensity and fundamental frequency.

How the investigation was planned

in the present investigation semantic factors are viewed as independent variables and acoustic factors are viewed as dependent variables. The semantic variables constitute the stimulus and the acoustic variables the response. As there was no opportunity to investigate any intermediate factors our approach is a typical black box approach involving only a correlation of stimulus and response.

The basis for the investigation was rather vague and can perhaps be stated in the following manner. The semantic difference between what is focus and what is background in a sentence is in a lot of cases perceptually very clear. This perceptual difference must be reflected acoustically - how?

To limit the scope of the investigation it was decided to eliminate all syntactic ways of marking focus. Every person that was tested was therefore given predetermined response sentences, where stress and intonation were the only things that could be varied to mark the focus of the sentence. The method which is easiest to use if one wants to stimulate focussing is to present a context where the sentence one is interested in is included as a natural part. Consider (8) and (9).

- (8) Someone has eaten my brownies
- (9) Bill has probably eaten them.

In (9) we know that someone has eaten my brownies and we want to assert that it is bill. We therefore normally focus on Bill by giving this word extra stress.

In the present investigation a modified contextual method in the form of a dialogue with questions and answers has been chosen. The tested person is asked to respond as naturally as possible to the questions that are posed using a predetermined response sentence. Below are some examples.

- (10) What happened yesterday?
- (11) Bill flew to New York.
- (12) Who flew to New York yesterday?
- (13) Bill flew to New York.
- (14) How did Bill go to New York yesterday?
- (15) bill flew to New York.

How the data was collected

The material investigated was collected on a tape in a sound-proof cage by an investigator who was posing questions of the above described type to the person tested. The tested person was asked to respond as naturally as possible using the predetermined response sentence. Below results which have been obtained from five Swedish speakers are presented. The following questions and response sentences were used. In the interview the questions were mixed so that the same response sentence did not reappear too often.

Questions I

- | | |
|--------------------------------------|---|
| (1) Vad hände i Kvällsöppet igår? | "What happened on TV yesterday?" |
| (2) Vad hände i Hylands hörna igår? | "What happened in Hyland's corner yesterday?" |
| (3) Vad gjorde Hyland i hörnan igår? | "What did Hyland do yesterday?" |

Response I

- (1) Hyland spelade piano. "Hyland played the piano".

Questions II

- | | |
|---|--|
| (1) Vad hände igår? | "What happened yesterday" |
| (2) Vad gjorde Pelle igår? | "What did Pelle do yesterday?" |
| (3) Vad rensade Pelle igår? | "What did Pelle clean yesterday?" |
| (4) Vem rensade en flundra igår? | "Who cleaned a flounder yesterday?" |
| (5) Vem rensade vad igår? | "Who cleaned what yesterday?" |
| (6) Vad gjorde Pelle med flundran igår? | "What did Pelle do with the flounder yesterday?" |

Response II

- | | |
|------------------------------|------------------------------|
| (1) Pelle rensade en flundra | "Pelle cleaned a flounder". |
| (2) Pelle rensade flundran | "Pelle cleaned the flounder" |

Questions III

- | | |
|---|---|
| (1) Vad hände igår? | "What happened yesterday?" |
| (2) Vad gjorde Pelle igår? | "What did Pelle do yesterday?" |
| (3) Vad fångade Pelle igår? | "What did Pelle catch yesterday?" |
| (4) Vem fångade en flundra igår? | "Who caught a flounder yesterday?" |
| (5) Vem fångade vad igår? | "Who caught what yesterday?" |
| (6) Vad gjorde Pelle med flundran igår? | "What did Pelle do with the flounder yesterday ?" |

Response III

- | | |
|-------------------------------|------------------------------|
| (1) Pelle fångade en flundra. | "Pelle caught a flounder" |
| (2) Pelle fångade flundran. | "Pelle caught the flounder". |

Questions IV

- | | |
|--|--|
| (1) Vad hände igår? | "What happened yesterday?" |
| (2) Vad gjorde Pelle och vad gjorde Kalle igår? | "What did Pelle do and what did Kalle do yesterday?" |
| (3) Vad fångade Pelle och vad fångade Kalle igår? | "What did Pelle catch and what did Kalle catch yesterday?" |
| (4) Vem fångade en flundra och vem fångade en krabba igår? | "Who caught a flounder and who, caught a crab yesterday?" |
| (5) Vem fångade vad igår? | "Who caught what yesterday?" |

Response IV

- | | |
|---|--|
| (1) Pelle fångade en flundra och Kalle fångade en krabba. | "Pelle caught a flounder and Kalle caught a crab". |
|---|--|

Analysis of be data

The recorded material has been mechanically analyzed in two ways: through a pitchmeter and an intensity-meter. The results of the analysis were registered as curve diagrams with the aid of a mingograph. The curves were then analyzed manually. The manual analysis involved first identifying the curves by listening to the material through a tape recorder. The curves were then segmented with respect to words. The duration of each segment was measured. Further the maximal values of Fo and intensity were measured for one series of questions. A comparison between the total volume of the Fo and intensity curves was made by drawing the curves on top of each other with the aid of transparent paper. As duration turned out to be the parameter which was most systematically corrected with focus, this parameter was given the most thorough analysis. For each segment its share relative to the utterance as a whole has been calculated. In this way interpersonal comparisons could be made disregarding difference in the speech of speech. On the basis of these relative figures we have then for each stimulus question calculated the average share of each segment relative to its response sentence.

As an extra control of the data we collected we asked a person who had not previously been involved with the investigation to listen to the whole material in order to indicate what response-sentences he found unnatural from a semantic point of view relative to each stimulus question. The sentences he found unnatural have in the tables involving duration been marked with an X.

Results

Of the three acoustic parameters duration, intensity and pitch, duration is the one that is most regularly and uniformly correlated with focus. This is quite clear if one compares each response sentence within a series of questions with the response sentence which is the answer to the first most neutral question in the series. In all cases except those that have double focus ("who cleaned what?") the focussed element has a longer duration than its corresponding element in the neutral sentence. This is especially clear in *who*-questions and in questions of the type, *What did x do to y?* The duration increase on *who* is true also of double focus inducing questions. On the other hand, the response sentence to such questions are strange in that they seem to totally lack any focus marking of the *what*-element in the question. As this is true of all response sentence to questions inducing double focus, it can perhaps be taken as evidence that one does not focus several noncontiguous elements in the same simple sentence. The natural thing for a sentence is to have only one focus. (See below about complex sentences).

As normal sentence stress usually falls on the last word of a sentence, a somewhat unexpected result appears if one compares the response sentences to question II (3) (*vad rensade*) (see above, with the response sentences to question II (1) (*vad hände*). The response sentences of type (3) seem to have a much longer duration on the last word than the sentences of type (1). Focus on the last word is therefore marked over and above normal. final word stress. This is surprising as some have thought that the last word because of final word stress would not be extra marked when in focus, This result therefore shows that focus marking at least when it concerns the last word of a sentence is independent of the normal stress pattern for sentences and thereby probably also independent of the so called stress cycle.

If we then compare response-sentences of type II (2) (*vad gjorde*) with response-sentences of type III (2), we find that the duration share of the verb has increased, while the NP which is object has had its share decreased. However, it still has a greater share than an object NP of type I. This result is just what one would expect from the point of view of focus since *vad gjorde x* (what did x do) entails a focussing of both verb and object, but the focus on the object should be weaker than in *vad rensade x* (what did x clean) and the focus on the verb should be weaker than in *vad gjorde x med y* (what did x do to y), What is surprising here is the high degree of correspondence between the semantic level and duration.

Let us then consider the series of questions in type IV and compare it with II and III. IV is different from II and III in from II having complex response sentences. This does not seem to cause any great change in the tendencies we already have observed. The complex response sentences have on an average the double duration of the simple response sentences that are most comparable i.e. those in series III. The relative durational share of the segments in both sentence constituents is roughly equal to the relative shares of the segments in series III. It is therefore clear that the coordination of the sentences does not influence the of focus to any great degree, a certain tendency to decrease marking of focus in the second sentence constituent relative to the first one can however be seen. This could possibly be due to fatigue.

If we turn from the focus to the background of the response sentences, are again some interesting results. Our a priori semantic hypothesis, was that the more clearly the subject of a sentence was

part. of its the less clearly it would be marked. Our data on duration (and to a certain extent our data on F_0) support this hypothesis. The subject of response sentences of type (1) that answer the question what happened have, a larger durational share (and sometimes higher F_0) than other response sentences except those of type (4) and (5) that answer questions containing *who* and therefore get their subjects directly focussed. In response sentences of type (2), (3) and (6) the subject of the response sentence *Pelle* is present already in the focus-inducing question. This has the effect of backgrounding the subject much more effectively than is done by questions of type (1). The backgrounding phenomenon is nicely illustrated by series I, where *Hyland* the subject of the response sentence gets an average relative series of duration of 29,4 - 27,6 - 25,2 for the questions (1), (2) and (3) respectively (see above). In the questions *Hyland* is put into focus to an increasing degree, which has the opposite effect on the response sentences, where *Hyland* instead is steadily pushed into the background. Again we can note a remarkable degree of correspondence between what is semantically predicable and the acoustic plane. This is all the more noteworthy as in this case there does not seem to be any great perceptual difference between the different degrees of backgrounding. We are in fact, because of this lack of perceptual corroboration, still somewhat sceptical of this result and plan to try to reconfirm it with new material

Let us now compare series III with series II. What distinguishes these series is the choice of verb (*rensa* (clean) vs *fånga* (catch)). The hypothesis is that *fånga* carries less information (more unmarked) than *rensa* in relation to *flundra* (flounder). From the point of view of information theory one would expect that *fånga* would be phonetically less marked than *rensa*. Our durational data weakly supports this hypothesis. *Rensa* has on an average a 2-3% higher share than *fånga*. However, the value of this evidence is very doubtful as [r sal) contains 5 segments while (ʋf y) contains 4.

As regards segmental maximum values for intensity and F_0 , we have been able to detect no tendencies what so ever. But some tendencies have appeared through a comparison of total curve patterns: 1) The F_0 of the second syllable in *Pelle* is always raised when this element is focussed as in questions containing *who* 2) The F_0 -difference between the first and the second syllable in *fånga* is always increased by the first syllable being raised and the second one being lowered as an answer to the question *what did x do to y*. In summary it can be said that the increase in duration makes the F_0 -curve drawn out which in many cases is correlated with a raise in the second syllable of a word in focus.

In observing the intensity curve we find tendencies which are similar to those found for the F_0 -curve. 1) The intensity is raised on the second syllable of words that are focussed in answer to questions containing *who* and *what*. 2) The intensity of the second syllable in *fånga* is almost as strong as the intensity of the first-syllable in answer to the question *what did x do to y* (One tested person here exhibits a certain difference.) In summary it can be said that an increase in duration is mirrored by an increase in maximum value also is an increase in volume greatly exceeding the purely scalar increase. Furthermore words in focus have more marked intensity peaks for each syllable than other words.

The extra control we mentioned earlier (see analysis of the data) did not change any of the results we have presented here. If anything it strengthened the tendencies we had observed.

Finally it could be worth while to point out that it is somewhat surprising to find that duration is the parameter in which the chief effects of focus are manifested. Prima facie it had seemed more plausible that the most important parameter would be intensity or F_0 , but one of the clearest results of this investigation is that this is not the case.

Conclusions

Focus is marked primarily through increased duration. Backgrounding is conversely marked by decreased duration. To some degree there are correlated changes in F_0 and intensity curves but they are much less clear and regular than those observed for duration. This study should be regarded as a pilot study, for it is obvious that no real conclusions can be drawn before a more extensive investigation involving many more speakers of several different languages has been carried out. Only on the basis of such an investigation could we begin to approach the problem of whether the realization of focus is language particular or more or less the same in all languages. A more extensive study should also incorporate a stronger check on perception, which could be done by letting speakers not only produce the focus upon semantic stimulus, but be letting them directly or indirectly indicate where they perceived the focus in a given sentence. The tentative goals for our next study will therefore be 1) To expand the basis for our investigation by including more speakers and more languages. 2) To make a much more careful investigation of the role of F_0 and intensity in realizing focus. 3) To more thoroughly correlate our acoustic results with the perception of focus. 4) To explore the relation between focus and other semantic phenomena for which duration seems to be the chief means of manifestation.

References

Chomsky, N. (1972) "Deep structure, surface structure and semantic interpretation" in Steinberg and Jakobovits (1972) *Semantics* Cambridge Univ. Press, London.

Duration F₀ intensity

Series I: Vad hände i Kvällsöppet igår
"What happened on TV yesterday?"

		Hyland Hyland	played spelade	the piano piano	total totalt
Informant	A1	16	19	25	60
	2	27	32	42	
	3	210	195	220	
	4	10	-16	-10	
	B1	17	142	18	49
	2	35	29	37	
	3	155	14	160	
	4	+1	-14	-10	
	C1	17	17	25	59
	2	29	29	42	
	3	125	140	155	
	4	-10	-6	-8	
D1	16	20	20	56	
2	29	36	36		
3	140	155	155		
4	-9	-10	-11		
E1	18	20	28		
1	27	30	42		
3	120	110	125		
	-8	-6	-6		

Average (% of total) 29,4 - 31,2 - 39,8

1. Duration mms (1mm = 20 msec)
2. Duration in % of total
3. F₀ max (Hz)
4. Intensity (dB)

Series I: Vad hände i Hylands hörna igår
 "What happened in Hyland's corner yesterday?"

		Hyland Hyland	played spelade	the piano piano	Total totalt
Informant	A1	13	16	26	55
	2	24	29	47	
	3	215	185	230	
	4	-7	-15	-8	
B1	19	17	26	62	
	2	31	27		42
	3	170	155		200
	4	-5	-9		0
C1	16	17	23	56	
	2	29	30		41
	3	130	125		145
	4	-9	-12		-8
D1	14	12	19	66	
	2	31	27		42
	3	135	145 135 max 160		
	4	-13	-12		-10
E1	15	10	31	66	
	1	23	30		47
	3	120	115		130
	4	-4	-5		-4

Average (% of total) 27,6 - 28,6 - 43,8

1. Duration mms (1mm = 20 msec)
2. Duration in % of total
3. F_o max (Hz)
4. Intensity (dB)

Series I: Vad gjorde Hyland i hörna igår
 "What did Hyland do yesterday?"

		Hyland Hyland	played spelade	the piano piano	Total totalt
Informant	A1	12	16	23	51
	2	24	32	45	
	3	195	180	220	
	4	-13	-15	-11	
B1	20	18	23	61	
	2	33	29		38
	3	165	140		165 max 220
	4	+1	-5		-5
C1	15	20	25	60	
	2	25	33		42
	3	120	135		155
	4	-7	-6		-3
D1	10	21	22	53	
	2	19	40		42
	3	145 max 170	165		135 max 160
	4	-15	-6		-9
E1	17	21	31	69	
	1	25	30		45
	3	115	115		130
	4	-5	-4		-5

Average (% of total) 25,2 - 33,0 - 42,4

1. Duration mms (1mm = 20 msec)
2. Duration in % of total
3. F_o max (Hz)
4. Intensity (dB)

Duration in mms (% of total)
Series II. Vad hände igår?

		Vad hände igår? "What happened yesterday?"					
		Pelle Pelle	cleaned rensade	a en	founder flunda	total totalt	
Informant	Ax	11 (20)	22	(39)	23	(41)	56
	B	17 (25)	25	(37)	26	(38)	68
	C	14 (22)	23	(36)	27	(42)	64
	D	18 (25)	28	(38)	27	(37)	73
	E	19 (24)	30	(38)	29	(37)	78

Average: 23,2 - 37,6 - 39,0

		Who Vem	cleaned rensade	a en	founder flunda	total totalt	
Informant	A	14 (26)	21	(39)	19	(35)	54
	B	21 (32)	24	(36)	21	(32)	66
	C	17 (27)	22	(35)	25	(39)	64
	D	23 (33)	23	(33)	23	(33)	69
	E	19 (26)	28	(39)	25	(35)	72

Average: 28,8 - 36,4 - 34,8

What	did Vad	Pelle clean yesterday rensade	Pelle igår	totalt		totalt	
Informant	A	10 (18)	24	(42)	23	(40)	57
	B	14 (21)	22	(38)	31	(46)	67
	C	13 (20)	22	(34)	29	(45)	64
	D	14 (23)	23	(38)	24	(39)	61
	E	17 (22)	28	(36)	32	(42)	77

Average: 2,8 - 36,6 - 42,4

Series II:		Vad händer igår? "What happened yesterday?"					
		Vad Vad	did gjorde	Pelle Pelle	yesterday igår	totalt totalt	
Informant	Ax	11 (20)	21	(38)	23	(42)	55
	B	13 (21)	21	(35)	26	(43)	61
	C	11 (19)	24	(41)	23	(40)	58
	D	16 (25)	26	(40)	23	(35)	65
	E	17 (22)	30	(39)	30	(39)	77

Average: 21,4 - 38,6 - 39,8

		Who Vem		cleaned rensade	what vad	yesterday igår		totalt totalt
Informant	Ax	11	(21)	23	(44)	18	(35)	52
	B	25	(31)	28	(34)	29	(35)	82
	C	22	(29)	26	(35)	26	(35)	74
	D	23	(27)	32	(38)	29	(35)	84
	Ex	20	(25)	30	(37,5)	30	(37,5)	80

Average: 26,6 - 37,6 - 36,6

Duration in mms (% of total) 1 mm = 20 ms
Series III:

What happened yesterday?
What hände igår?

		Pelle Pelle		caught fångade		a flounder en flundra		totalt totalt
Informant	A	12	(20)	20	(34)	27	(46)	59
	B	13	(24)	17	(32)	24	(44)	54
	C	12	(19)	22	(35)	28	(45)	62
	D	15	(23)	25	(38,5)	25	(38,5)	65
	Ex	14	(21)	25	(37)	28	(42)	67

Average: 21,4 - 35,2 - 43,0

Who caught a flounder yesterday?
Vem fångade a flunder igår

		Pelle Pelle		caught fångade		a flounder en flundra		totalt totalt
Informant	A	14	(25)	20	(36)	21	(38)	55
	B	19	(34)	18	(32)	19	(34)	56
	C	14	(27)	20	(38)	18	(35)	52
	D	20	(30)	22	(33)	24	(36)	66
	E	17	(25)	24	(35)	27	(40)	68

Average: 28,2 - 34,8 36,6

		What did Vad		Pelle catch fångade Pelle		yesterday igår		totalt totalt
Informant	A	12	(21)	20	(36)	24	(42)	56
	B	12	(21)	19	(3)	27	(46)	58
	C	9	(15)	19	(31)	31	(53)	59
	D	15	(23)	23	(35)	28	(42)	66
	Ex	14	(20)	24	(35)	31	(45)	69

Average: 20,0 - 34,0 - 45,6

What did Pelle yesterday?
Vad gjorde Pelle igår?

		Pelle Pelle		caught fångade		a flounder en flundra		totalt totalt
Informant	Ax	10	(18)	20	(36)	25	(45)	55
	B	12	(21)	18	(32)	26	(46)	56
	C	11	(18)	22	(37)	27	(45)	60
	D	15	(22)	26	(38)	27	(40)	68
	Ex	16	(24)	21	(31)	31	(46)	68

Average: 20,6 - 34,8 - 44,4"

What did Pelle with the flounder yesterday?
Vad gjorde Pelle med flundran igår?

		Pelle Pelle		cleaned rensade		the flounder flundran		totalt totalt
Informant	A	11	(21)	20	(38)	22	(42)	53
	B	12	(17)	33	(47)	26	(37)	71
	C	14	(23)	25	(41)	22	(36)	61
	D	14	(23)	25	(40)	23	(37)	62
	Ex	17	(22)	29	(37)	33	(42)	79

Average: 21,2 - 40,6 - 38,8

Who caught
Vem

		Who caught Vem		caught whatyesterday fångade vad igår		totalt totalt		totalt totalt
Informant	Ax	14	(25)	20	(36)	22	(39)	56
	B	23	(28)	26	(32)	32	(40)	81
	C	20	(29)	22	(31)	28	(40)	70
	D	19	(28)	22	(32)	27	(40)	68
	Ex	19	(25)	27	(35)	31	(40)	77

Average: 27,0 - 33,2 - 39,8

What did Pelle to the flounder yesterday?
Vad gjorde Pelle med flundran igår?

		Pelle Pelle		caught fångade		the flounder flundran		totalt totalt
Informant	A	11	(17)	31	(47)	24	(36)	66
	B	13	(20)	28	(44)	23	(36)	64
	C	11	(20)	22	(41)	21	(39)	54
	D	12	(21)	22	(39)	23	(40)	57
	Ex	15	(22)	25	(36)	29	(42)	69

Average: 20 - 41,4 - 38,6

Pitch (Hz)
Series III:

"What happened yesterday?"
Vad hände igår?

Pelle
Pelle

caught
fångade

a flounder
en flundra

Informant		Pelle	caught fångade	a flounder en flundra
	A	220	190	220
	B	230	165	160
	C	140	135	165
	D	155	155	175
	E	135	120	165

Who
Vem

caught
fångade

a flounder yesterday?
en flundra igår?

Informant		Who Vem	caught fångade	a flounder yesterday? en flundra igår?
	A	220	235	210
	B	230	220	215
	C	140	155	155
	D	200	180	180
	E	150	140	140

What
Vad

did Pelle catch yesterday?
fångade Pelle igår?

Informant		What Vad	did Pelle catch yesterday? fångade Pelle igår?	
	A	220	190	220
	B	165	165	220
	C	130	120	155
	D	140	160	160
	E	125	115	140

What did Pelle yesterday?
Vad gjorde Pelle igår

Pelle
Pelle

caught
fångade

a flounder
en flundra

Informant		Pelle Pelle	caught fångade	a flounder en flundra
	A	220	220	215
	B	240	230	220
	C	135	120	140
	D	150	180	160
	E	135	115	140

Who
Vem

caught what
fångade vad

yesterday
igår

Informant		Who Vem	caught what fångade vad	yesterday igår
	Ax	215	220	200
	B	210	190	240
	C	140	140	150
	D	165	170	160
	Ex	125	115	135

What did Pelle with the flounder yesterday?
Vad gjorde Pelle med flundran igår?

		Pelle Pelle	caught fångade	the flounder flundran
Informant	A	215	230	220
	B	220	220	200
	C	135	145	150
	D	145	175	210
	E	125	130	140

Duration
Series IV:

"What happened yesterday?"
Vad hände igår?

		Pelle Pelle	caught a fångade en	flounder a. flundra o.	Kalle Kalle	caught fångade	a crab en krabba	Totalt
Informant	A	12 (11)	20 (18)	25 (23)	13 (11)	21 (19)	20 (12)	111
	B	16 (12)	18 (14)	37 (28)	17 (13)	18 (14)	25 (19)	131
	C	15 (12)	22 (17)	28 (22)	13 (10)	23 (18)	25 (20)	126
	D	15 (12)	23 (19)	28 (23)	11 (11)	23 (19)	20 (16)	123
	E	16 (11)	24 (17)	28 (20)	21 (15)	26 (19)	24 (17)	139
Average		11,6	17,0	23,2	12,0	17,8	18,0	

		Whocaught a founder Vemfångade en flundra	and who caught o. vem fångade	a crab en krabba	Totalt			
Informant	Ax	14 (13)	20 (19)	21 (19)	13 (12)	21 (19)	19 (18)	108
	B	27 (19)	20 (14)	29 (20)	24 (17)	20 (14)	22 (15)	142
	C	17 (13)	24 (18)	29 (22)	16 (12)	21 (16)	24 (18)	131
	D	21 (17)	21 (17)	26 (21)	17 (13)	22 (17)	19 (15)	126
	E	21 (14)	27 (18)	31 (20)	24 (16)	25 (16)	25 (16)	153
Average		15,2	17,2	20,4	14,0	16,4	16,4	

What did Pelle catch and what did Kalle catch yesterday?
Vad fångade Pelle och vad fångade Kalle igår?

								Totalt
Informant	A	11 (10)	21 (19)	24 (22)	13 (11)	21 (19)	21 (19)	111
	B	18 (13)	23 (16)	32 (23)	19 (14)	19 (14)	29 (21)	140
	C	12 (9)	21 (17)	35 (28)	13 (10)	22 (17)	24 (19)	127
	Dx	14 (12)	19 (16)	31 (26)	15 (12)	21 (17)	20 (17)	120
	E	16 (11)	26 (17)	30 (20)	16 (11)	24 (16)	27 (18)	149
Average		11,0	17,0	23,8	11,6	16,6	18,8	

What did Pelle do and what Did Kalle do yesterday?
Vad gjorde Pelle och vad gjorde Kalle igår?

								Totalt
Informant	Ax	12 (11)	20 (19)	22 (21)	12 (11)	20 (19)	19 (18)	105
	B	21 (14)	27 (18)	32 (21)	24 (16)	24 (16)	25 (16)	153
	C	15 (11)	28 (21)	33 (25)	15 (11)	20 (15)	23 (17)	134
	Dx	17 (12)	30 (21)	28 (20)	19 (13)	26 (18)	21 (15)	141
	E	21 (14)	25 (17)	30 (20)	20 (13)	27 (18)	26 (17)	149
Average		12,4	19,2	21,4	12,8	23,4	22,8	

Who caught what yesterday Vem fångade vad igår												Totalt		
Informant	Ax	11	(10)	20	(18)	24	(22)	12	(11)	22	(20)	20	(18)	109
	B	30	(19)	28	(18)	28	(18)	26	(17)	24	(15)	19	(12)	155
	C	21	(16)	23	(18)	34	(26)	12	(9)	19	(15)	22	(17)	131
	D	24	(15)	34	(22)	29	(19)	18	(12)	28	(18)	23	(15)	156
	E	17	(12)	28	(18)	32	(22)	18	(12)	26	(18)	27	(19)	146
Average		14,4		18,8		21,4		12,2		17,2		16,2		

Who caught the flounder and who caught the crab yesterday?
Vem fångade flundran och vem fångade krabban igår?

Pelle caught the flounder and Kalle caught the crab Pelle fångade flundran och Kalle fångade krabban												Total		
Informant	A	13	(13)	16	(15)	25	(24)	13	(13)	17	(16)	20	(19)	104
	B	23	(17)	21	(15)	30	(22)	22	(16)	22	(16)	21	(15)	139
	C	20	(15)	20	(15)	33	(25)	18	(14)	22	(17)	20	(15)	133
	D	19	(15)	18	(14)	28	(22)	17	(14)	20	(16)	23	(18)	125
	E	21	(14)	22	(15)	33	(15)	21	(14)	21	(14)	29	(20)	147
Average		14,8		14,8		21,6		14,2		15,8		17,4		