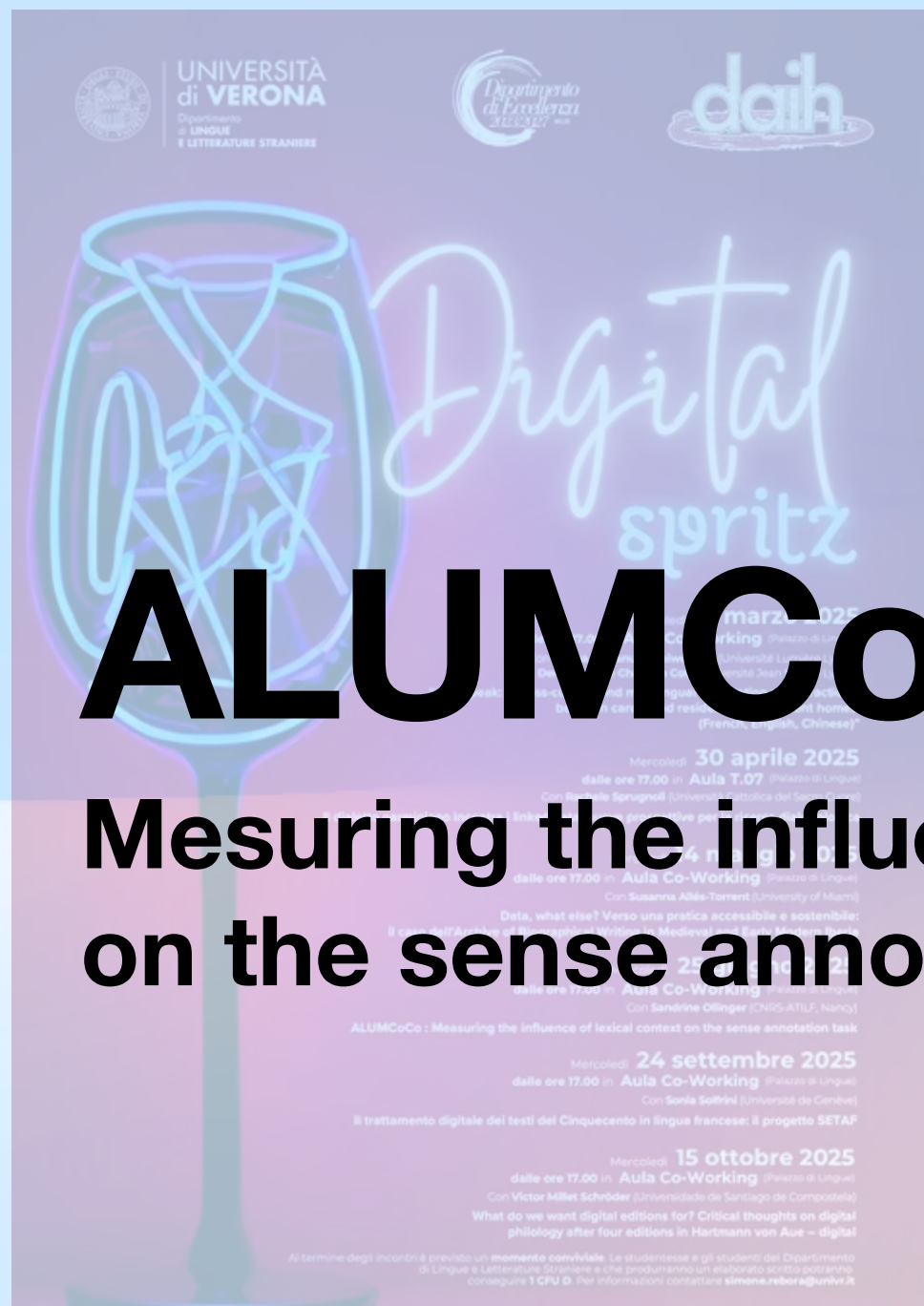




ALUMCoCo

Mesuring the influence of lexical context
on the sense annotation task

Sandrine Ollinger — 25 giugno 2025



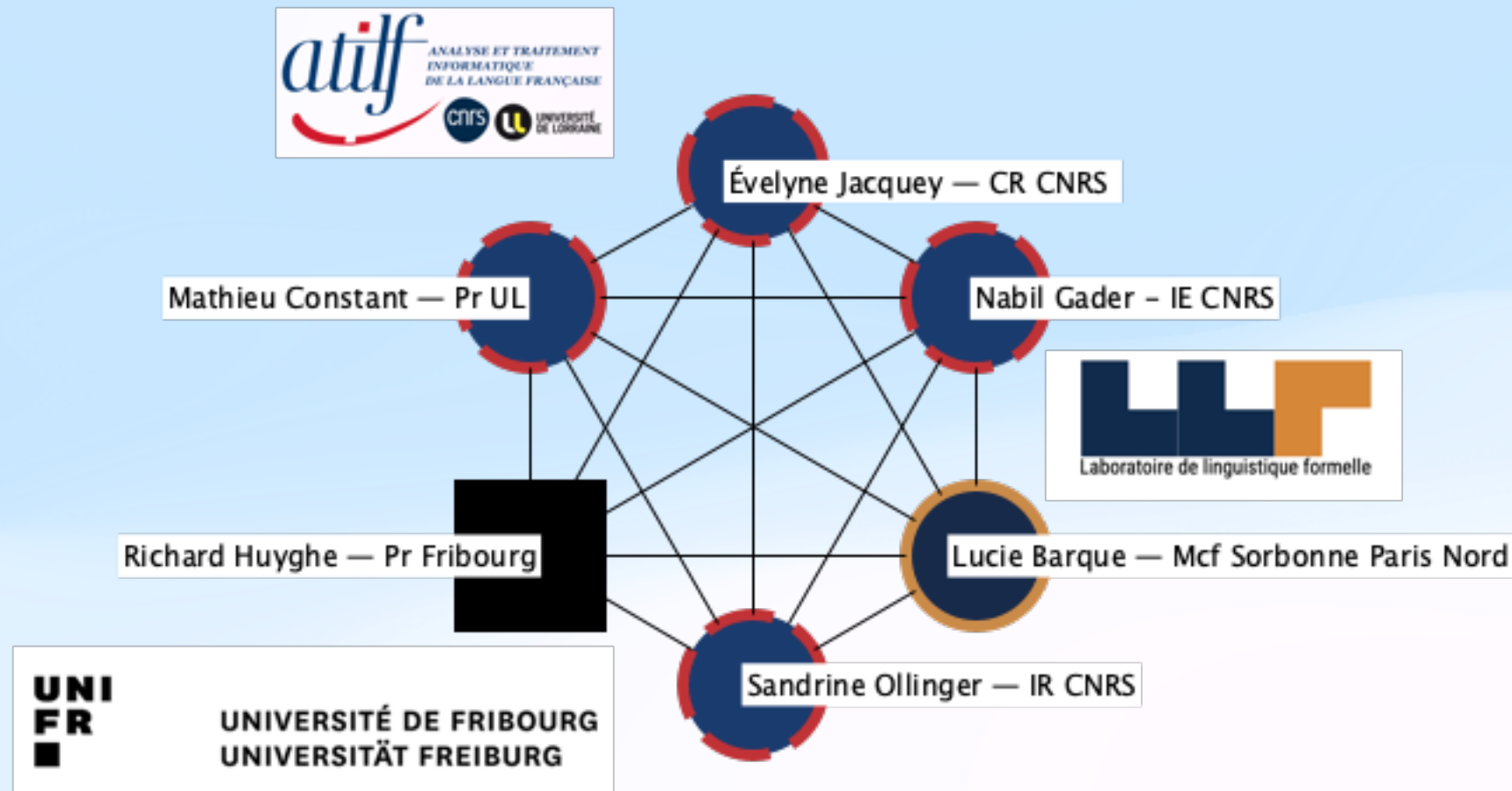
Plan

- What we want to do ?
- A questionnaire addressed to the general public
- Who have participated ?
- What did we collect ?
- Our statistical predictors
- Future analyses

What we want to do ?

ALUMCoCo Team

2023 - ...



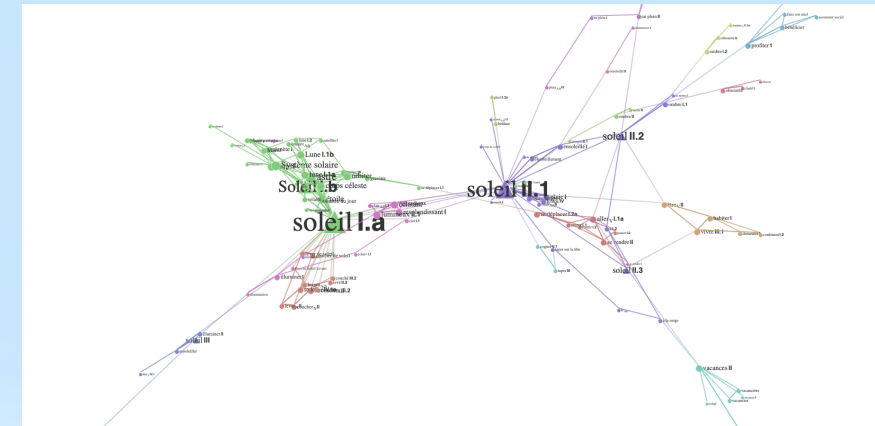
03.24 — 04.25

Lexical annotation

Tu es le **soleil** de ma vie.

1 context

1 occurrence to be annotated



1 inventory of senses

Goal : associate 1 sense from the inventory with the occurrence in context

SOLEIL III

Tu es le **soleil** de ma vie.

From SOLEIL to online questionnaire (1)

- 2023-2024 : manual annotation *soleil* (500 occurrences)
- July 2024 :
 - Selection of 18 contexts with variable difficulty (6 easy | 6 difficult | 6 other)
 - Annotation + assignation of a difficulty score [0 to 5] for each occurrence
 - Analyse
 - More or less difficult, what does it mean ?
 - What part does play the context ?
 - Which linguistics elements influence the difficulty ?

More difficult to annotate

What does it mean ? — July 2024 —

- It takes more time
- Do we assign higher difficulty scores ?
 - ⚠ lot of variation in the scores awarded
- Is there more disagreement between us on the sense to be attributed?
 - ⚠ expert annotators, few disagreements

Linguistic hints

Which linguistic elements influence the difficulty ?

- Inventory of senses (proximity between some senses)
- Length of contexts (too short or too long)
- Language register, style, vocabulary rarity, lexical discord, unusual collocations and the quantity of adjectives
- Presence of lexical units bound to 2 or more distinct senses in the LN-fr
- Cultural references
- Syntactic structures : overlapping, ambiguity
- ...

From SOLEIL to online questionnaire (2)

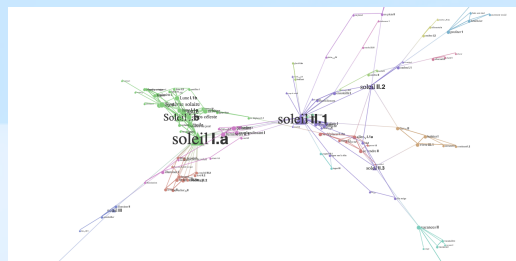
- Conclusions
 - Diversify the senses inventories
 - Collect difficulty scores from non-experts
 - Use an online questionnaire
- July - December 2024 : design questionnaire
- January 2025 : Research Ethics Committee opinion
- February 2025 : data collection

A questionnaire addressed to the general public

What's the point ?

To what extent does the difficulty of the lexical annotation task depend on the context of the occurrence to be annotated?

- We want to compare :



VS.

Tu es le **soleil** de ma vie.

Le **soleil** brille.

Le **soleil** est ton ami.

VS.

🕒 m 11,24 s.
σ 5,78 s.

📏 m 2
σ 1,41



1 x I.a
2 x II.2

- with the help of mixed-effects regression models



Choice of senses inventories (1)

The vocables [(potentially) polysemic word]

- 21 inventories of senses well described in the LN-fr
 - 7 vocables with 4 senses
 - 7 vocables with 3 senses
 - 7 vocables with 2 senses
- Familiar nouns (according to Lexique 3 — DefLem field)
- A varied semantic distance between senses, balanced between each group of 7

LN-fr query

- Vocables without homonym
 - 2, 3 ou 4 senses
 - Nominal
-
- for which at least as 3 different LF are used in the description
- ➡ 111 vocables founded
- 22 with 4 senses
 - 32 with 3 senses
 - 57 with 2 senses

Final selection

- By elimination
 - Incomplete polysemy (main senses missing)
 - Senses too difficult to distinguish
- Annotation of senses into large semantic classes + balanced between groups of polysemy degrees
 - Frequency
 - Distribution
- **4 senses** ADDITION, CADAVRE, COSTUME, CRIME, PING-PONG, PRÉPARATION, SERVIETTE
- **3 senses** CIGARETTE, ENVELOPPE, JOGGING, MÉLANCOLIE, PROMENADE, SKI, VÉHICULE
- **2 senses** CANAPÉ, FAUTEUIL, GRAND-MÈRE, KLAXON, MONARCHIE, ORAGE, VÉLO

Choice of senses inventories (2)

Numbering & definitions

- Simple numbering system from 1. to 4.
- Definitions borrowed (+ adapted) or created



- Illustrated by created examples
- Reordering senses
 - JOGGING 1.1 → 2.
 - JOGGING 1.2 → 1.

Example

SKI

Ski

1. Patin très long, légèrement recourbé en avant, que l'on fixe au pied et qui sert à glisser sur la neige. [*Je mets mes skis et j'arrive.*]
2. Accessoire qui permet à un véhicule de glisser sur la neige. [*Cette motoneige est équipée de skis en plastique.*]
3. Sport de glisse sur neige ou sur eau, pratiqué à l'aide de skis. [*Tu préfères le ski de fond ou le ski alpin ?*]

- 1. and 3. borrow to <https://fr.wiktionary.org/wiki/ski>
- « que l'on fixe au pied » borrow to Antidote.
- 2. created

Choice of contexts (1)

420 contexts



FrTenTen23
(Jakubíček & al. 2013)

Shuffle

100 s per lemma

Sense annotation

Manual

Quick

Preparatory measures

Balancing

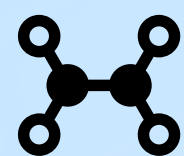
Completion

20 contexts by vocable

5 per sense / 6-7 per sense / 10 per sense

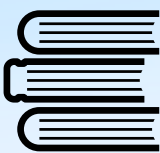
Example of preparatory measures

Une fois en sentier, il est recommandé de trouver les **skis** qui conviennent à votre motoneige et à votre type de conduite.  Stanza



en, à [x2], motoneige

	LN-fr neighbours	all	ratio
lem.	4	22	0,18



fois, en, sentier, être, de [x2],
convenir, à [x2], son [x2],
motoneige, type

	sketch	all	ratio
lem.	13	22	0,59



getalp / Flaubert

skis

0.01490394864231348

Final balancing

Per degree of polysemy

	Distribution of LN-fr neighbours			Ratio collocates / tokens		LLM (FlauBERT)	
	0	1	more than 1	average	σ	average	σ
4 senses	56	45	39	0,3651	0,06	0,14	0,09
3 senses	56	45	39	0,3799	0,05	0,09	0,05
2 senses	56	45	39	0,3638	0,06	0,08	0,08

- Tokenisation problems with LLM
 - klaxon → ‘k’
 - grands-mères → ‘grands’
 - jogging → ‘jo’
 - mélancolies → ‘mélanco’

Choice of contexts (2)

63 (3 x 21) training contexts

- Quotations that may have been adapted (frTenTen23)

Ce programme propose de regrouper des participants (4 à 6), à la journée au départ de la station de Flaine pour découvrir le **ski** de randonnée.

Le domaine est actuellement ouvert à 80%. Le retour station se fait **skis** aux pieds.

Le 14 octobre, Hermann Geiger atterrit pour la première fois sur le glacier du Blüemlisalp à bord d'un Piper Super Cub, nouvel avion équipé de **skis** métalliques rétractables.

Integration to Limesurvey

<https://enquetes.univ-lorraine.fr>

Français (Langue de base):	https://enquetes.univ-lorraine.fr/index.php/456579?lang=fr
URL de fin :	-
Nombre de question(s)/groupe(s) :	1140/43

- 1 group of preliminary questions
- 42 annotation groups
 - 1 inventory of senses
 - 3 sets of training questions
 - 10 sets of questions for statistical modelling
- Random allocation of an annotation group at the end of the preliminary questions

Example SKI

Example SKI

* Entrons maintenant dans le vif du sujet.

Notre dictionnaire répertorie 3 sens pour le mot SKI :

1. Patin très long, légèrement recourbé en avant, que l'on fixe au pied et qui sert à glisser sur la neige. [*Je mets mes skis et j'arrive.*]

2. Accessoire qui permet à un véhicule de glisser sur la neige. [*Cette motoneige est équipée de skis en plastique.*]

3. Sport de glisse sur neige ou sur eau, pratiqué à l'aide de skis. [*Tu préfères le ski de fond ou le ski alpin ?*]

Prenez le temps de vous familiariser avec ces 3 sens.

Vous allez devoir choisir lequel d'entre eux se trouve dans chacun des 13 courts textes à venir.

Quand vous vous sentez prêt·e, cliquez sur « Suivant »

Example SKI

* Lisez ce court extrait (1/13) :

Ce programme propose de regrouper des participants (4 à 6), à la journée au départ de la station de Flaine pour découvrir le **ski** de randonnée.

Quel est le sens de **ski** dans ce texte ?

? Si aucun sens ne vous convient, choisissez le plus proche.

- ☐ 1. Patin très long, légèrement recourbé en avant, que l'on fixe au pied et qui sert à glisser sur la neige. [*Je mets mes skis et j'arrive.*]
- ☐ 2. Accessoire qui permet à un véhicule de glisser sur la neige. [*Cette motoneige est équipée de skis en plastique.*]
- ☐ 3. Sport de glisse sur neige ou sur eau, pratiqué à l'aide de skis. [*Tu préfères le ski de fond ou le ski alpin ?*]

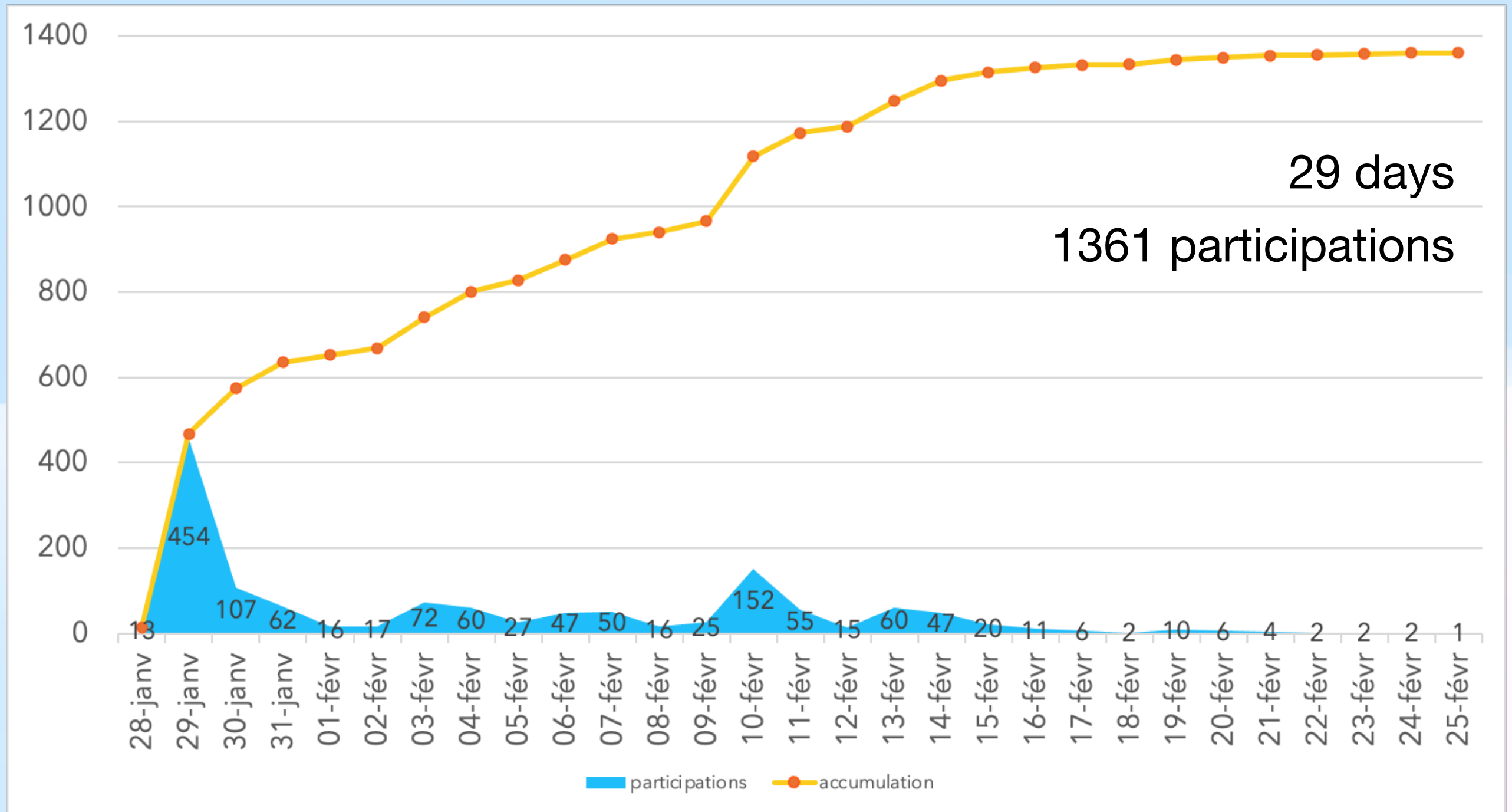
Example SKI

* Avez-vous trouvé qu'il était difficile de choisir un sens ?

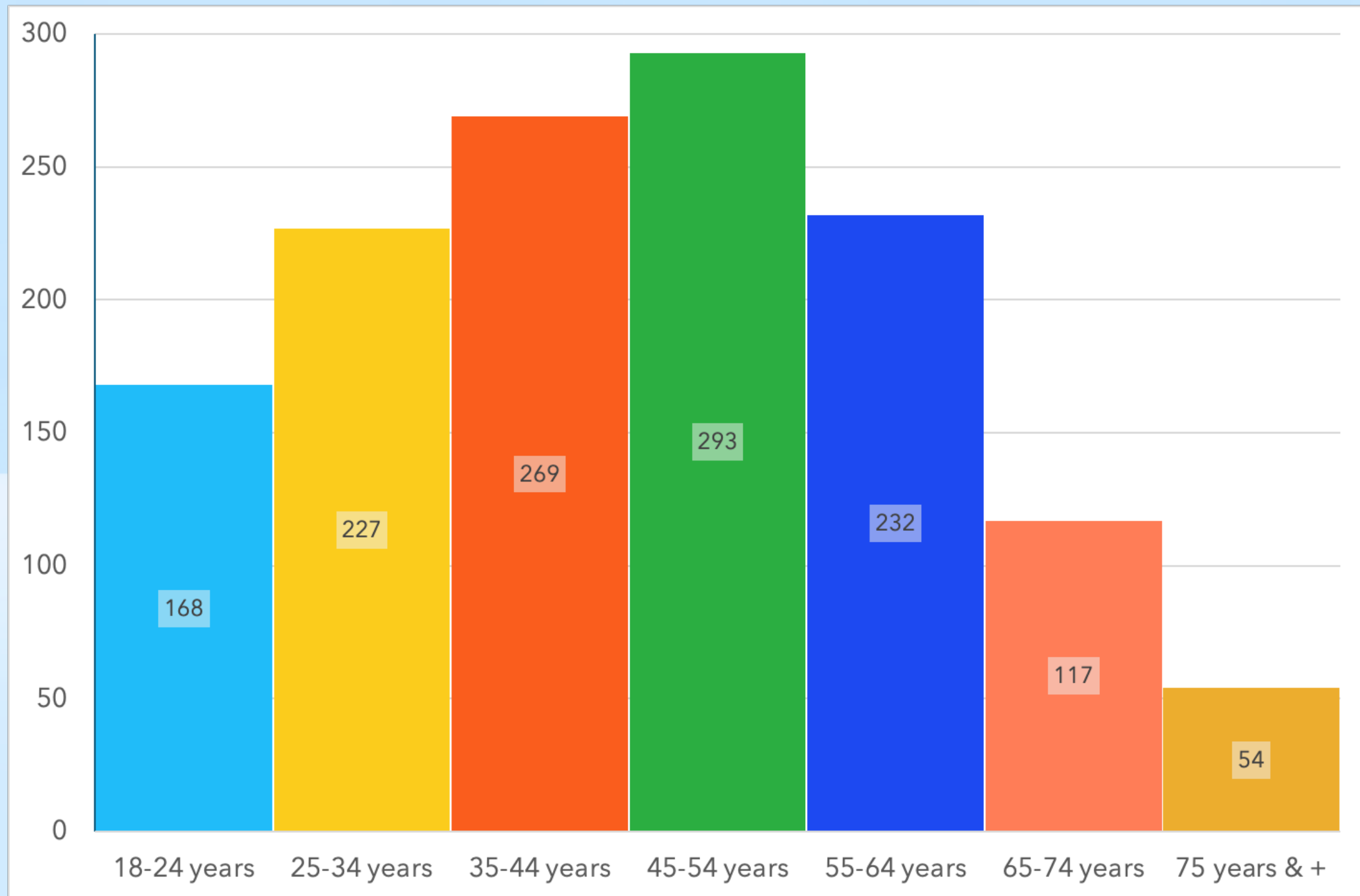


Who participated ?

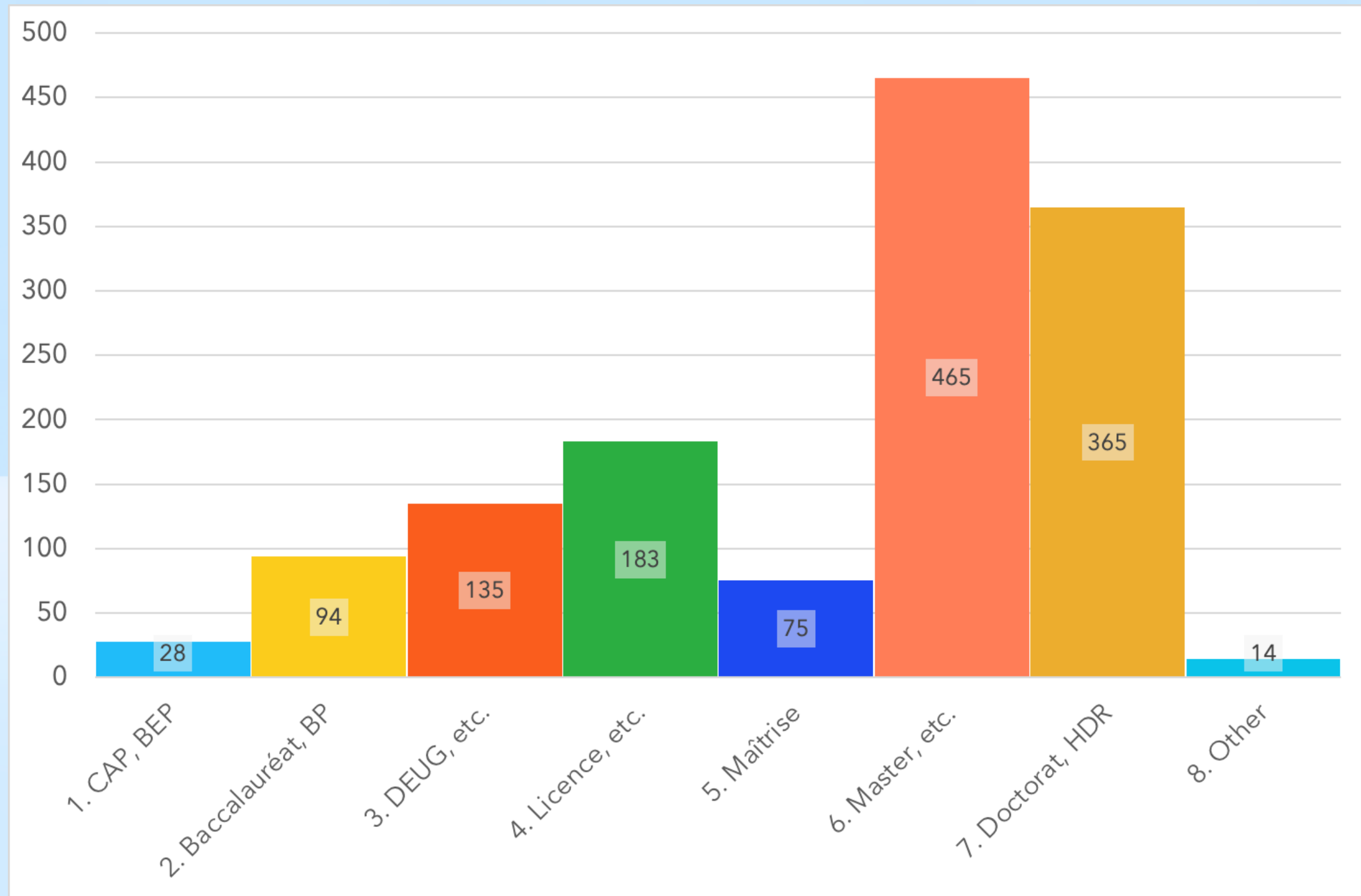
When ?



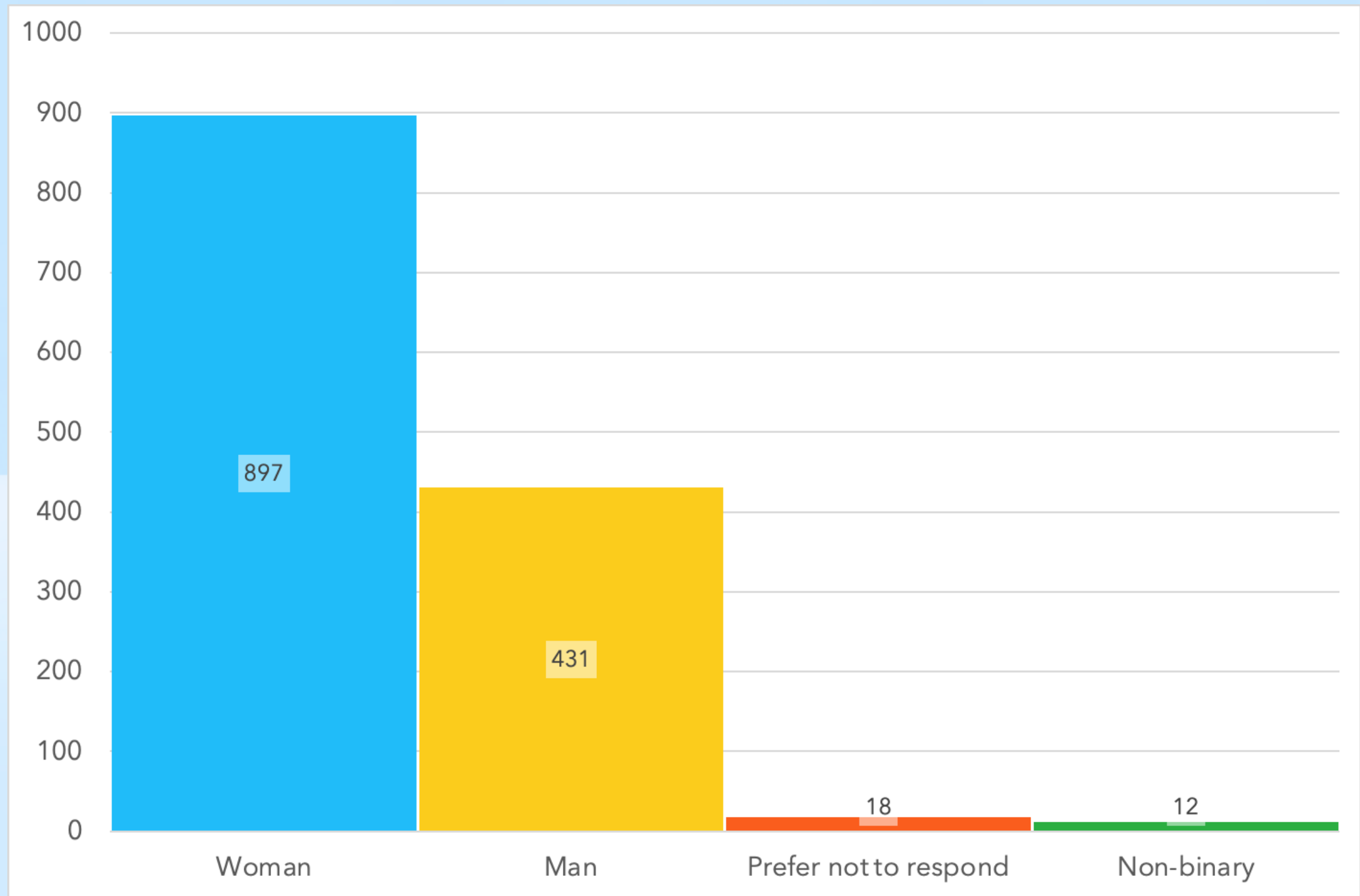
Ages



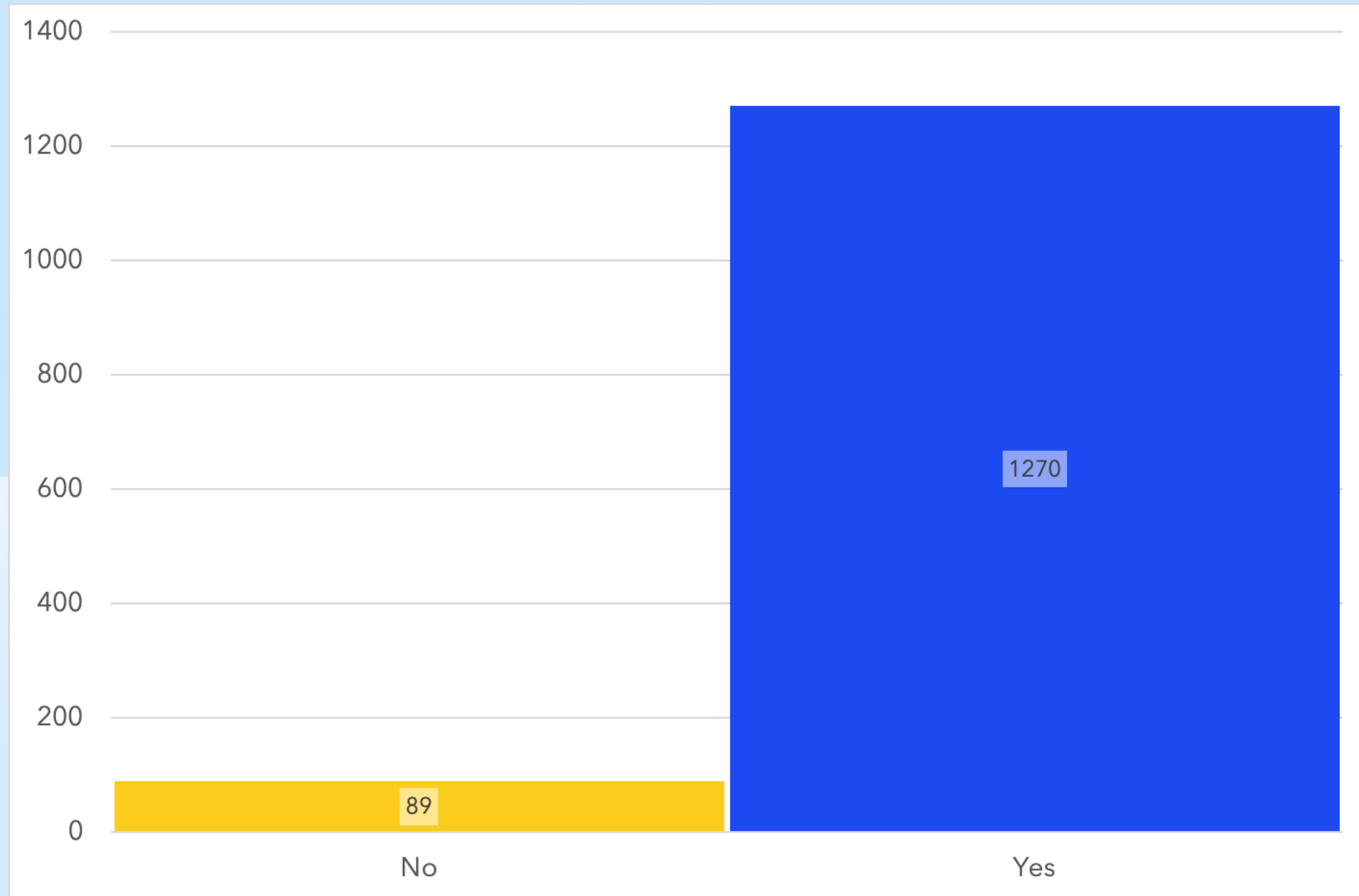
Studies



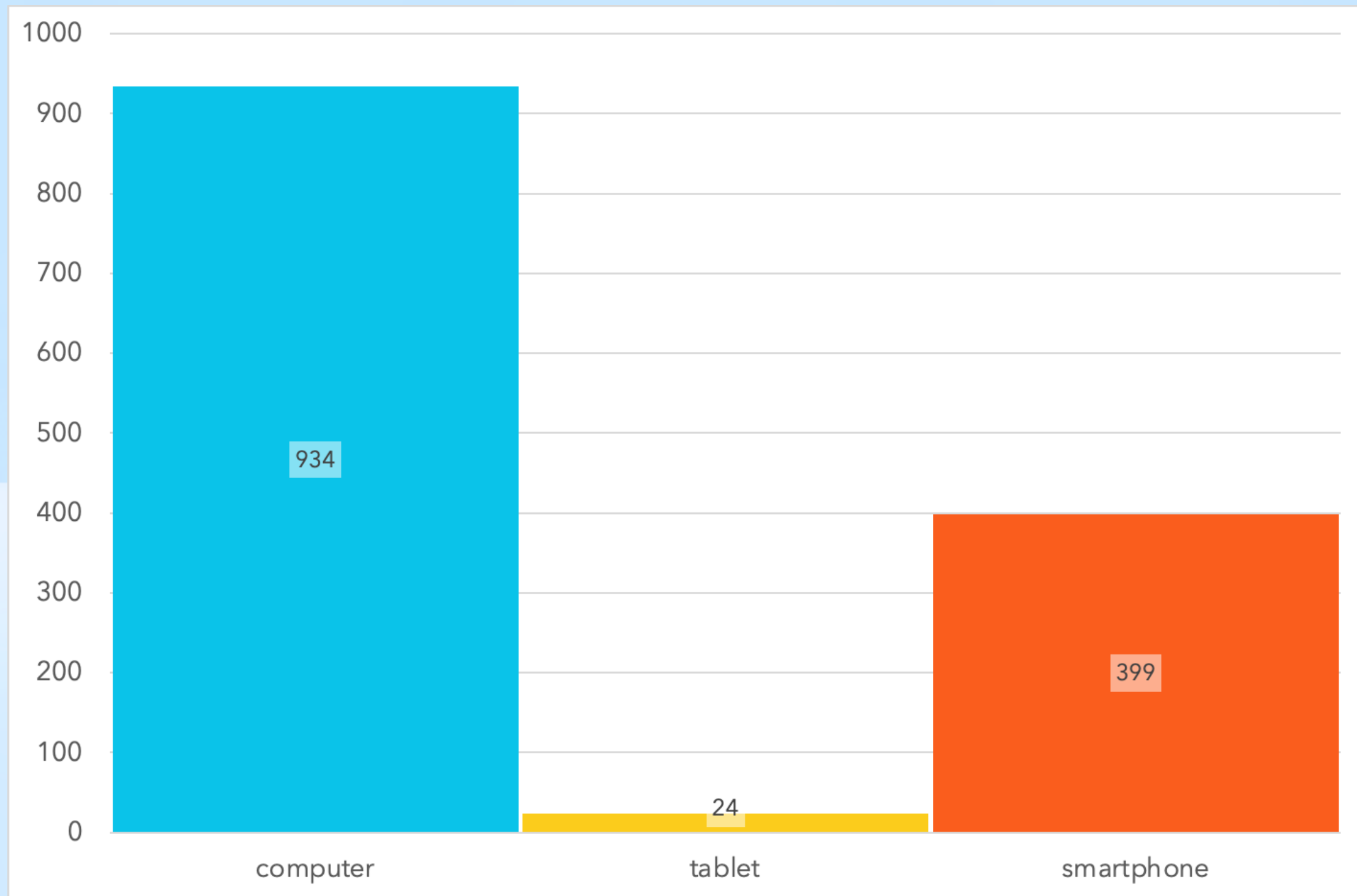
Genders



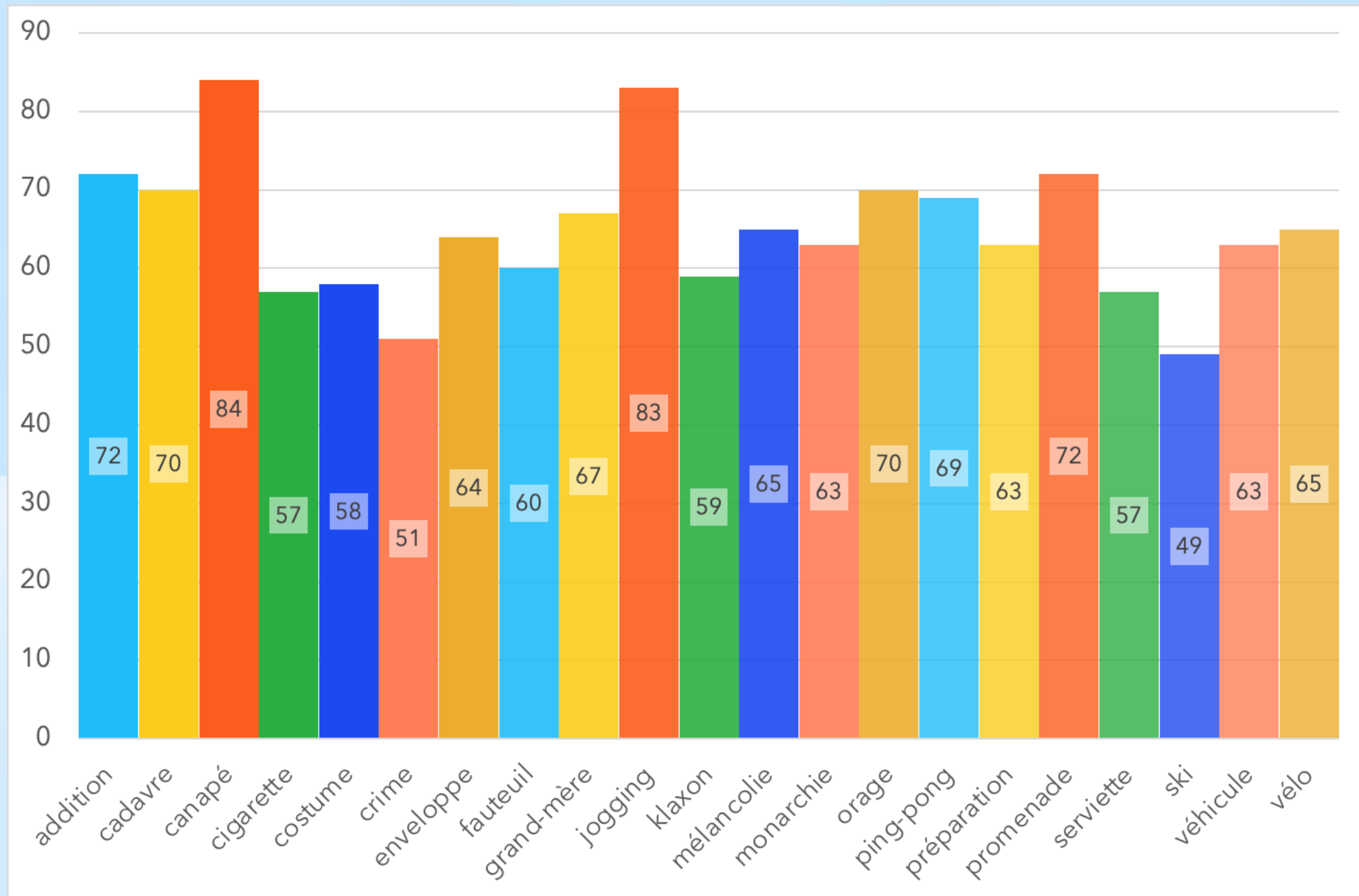
French as native language ?



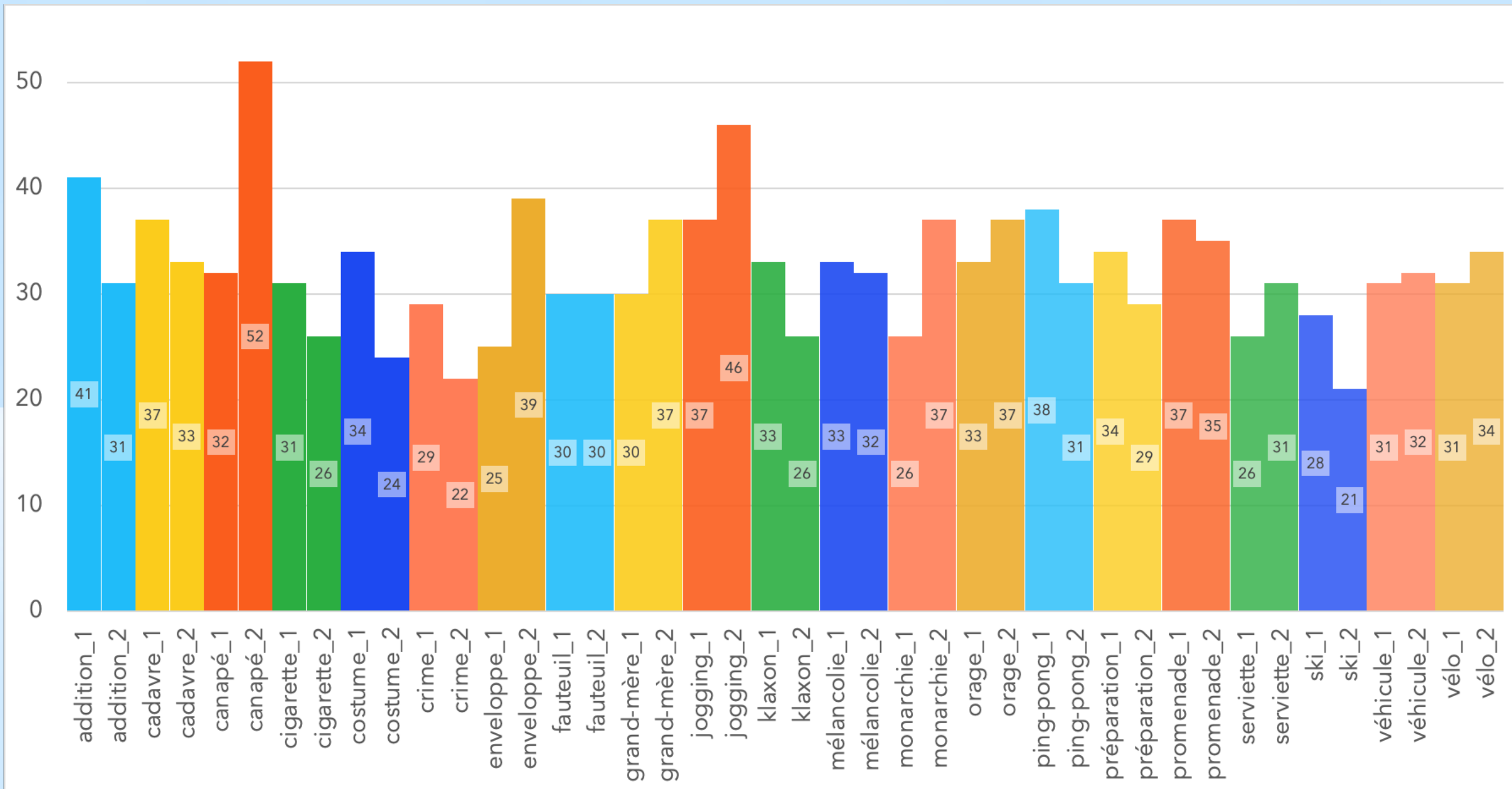
Medium



Responses per inventory



Responses per context

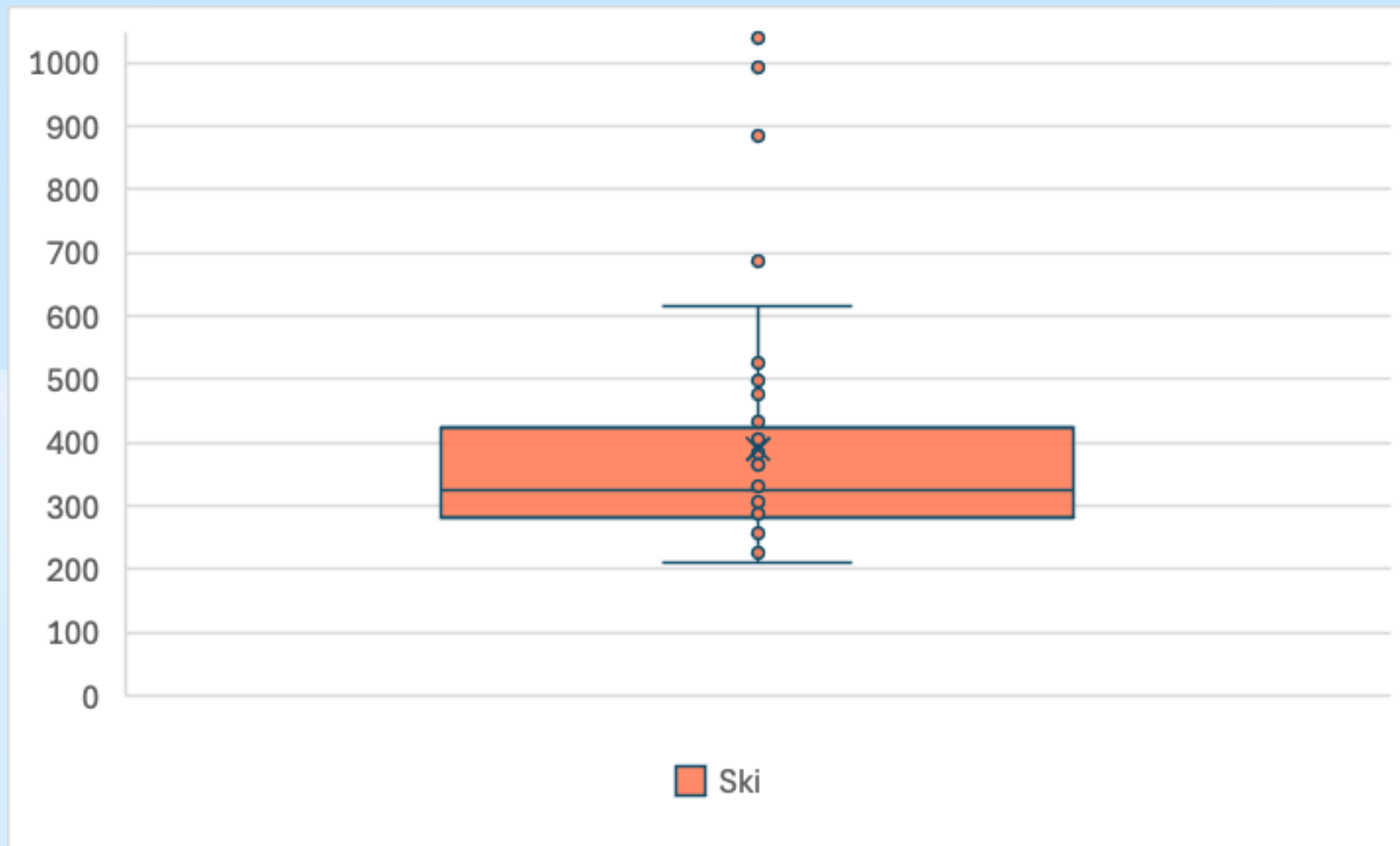


What have we actually collected ?

Our dependent variables

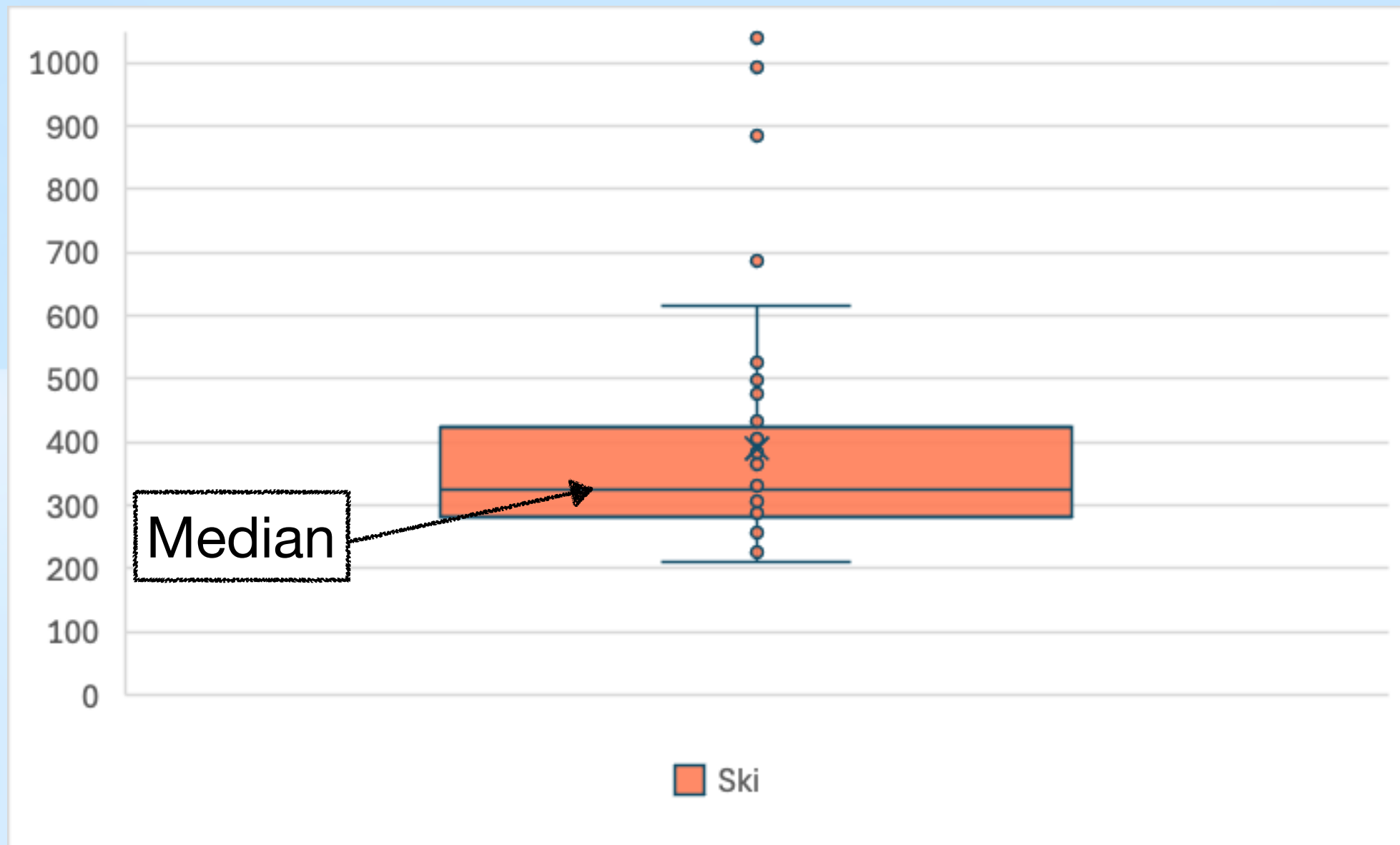
How to read a box plot

49 times for the vocable SKI



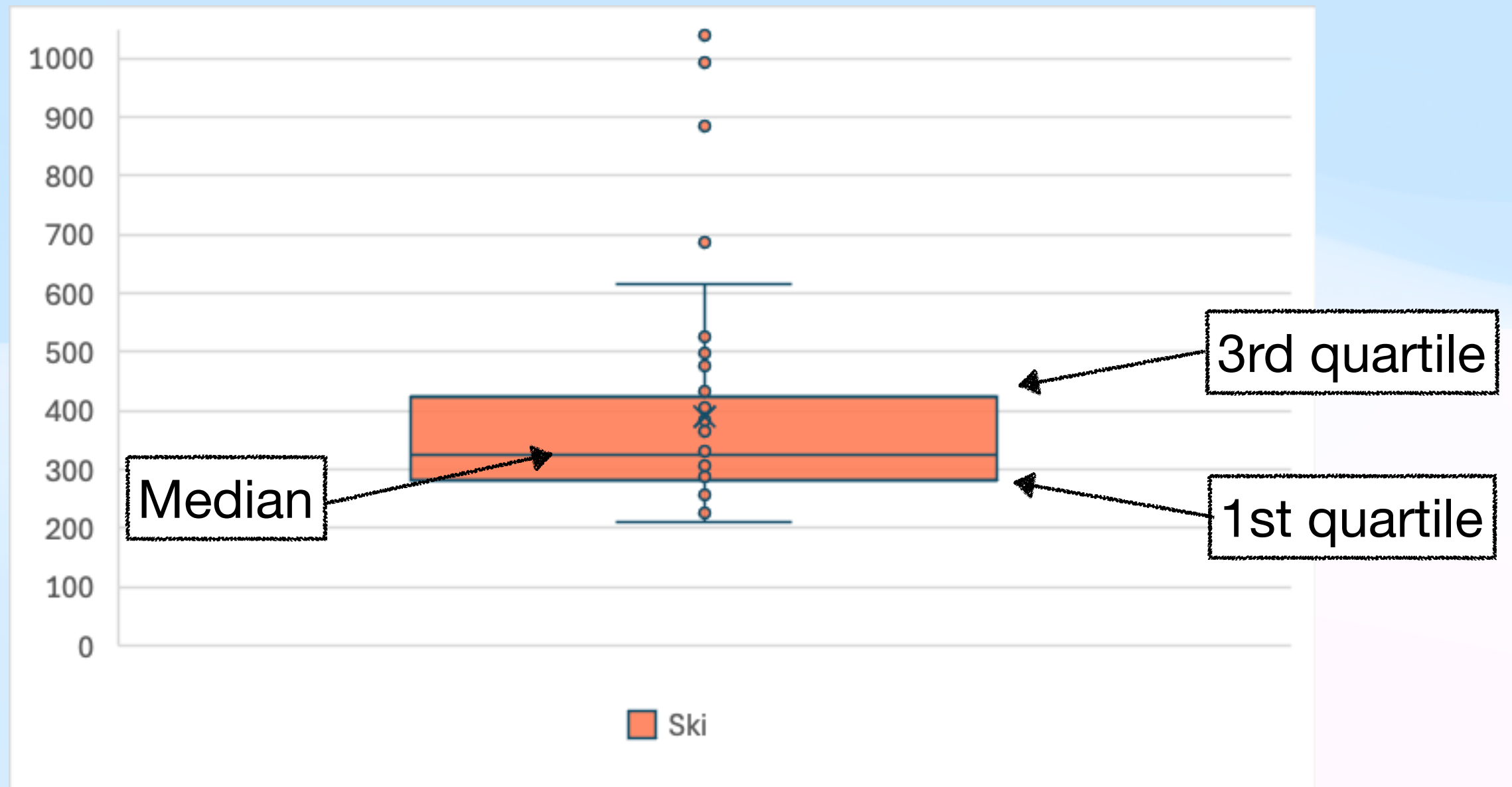
How to read a box plot

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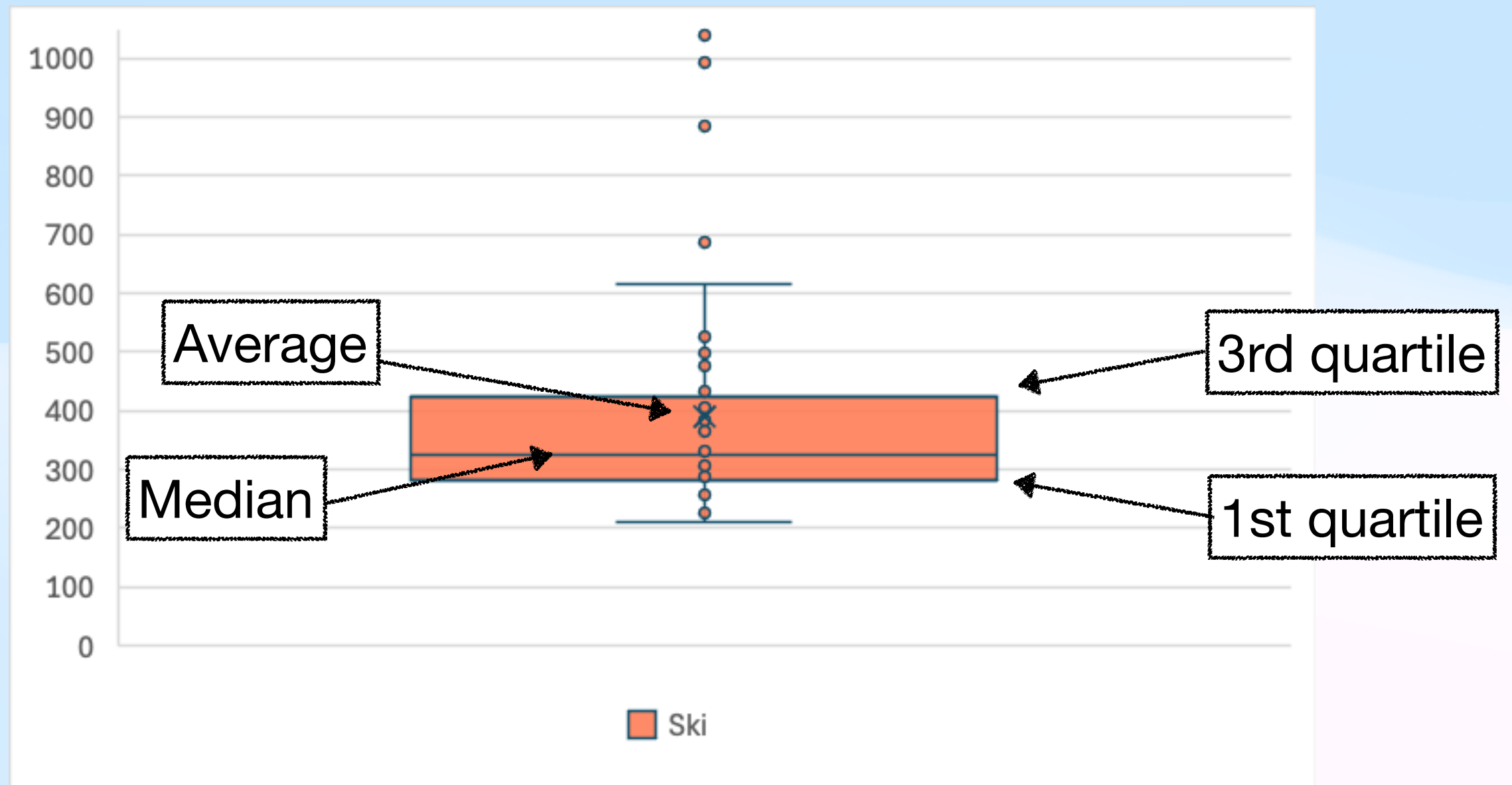
How to read a box plot

49 times for the vocable SKI



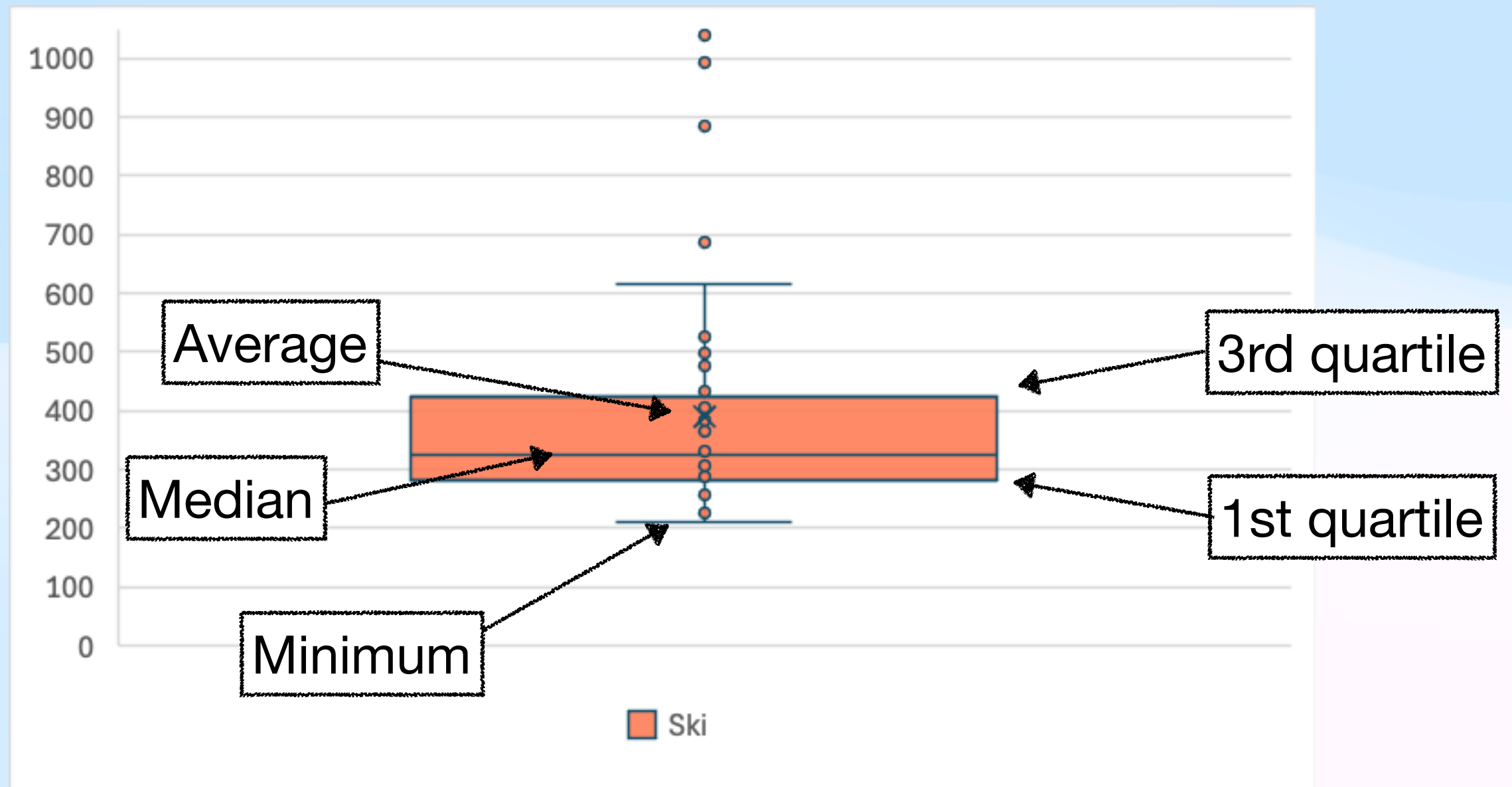
How to read a box plot

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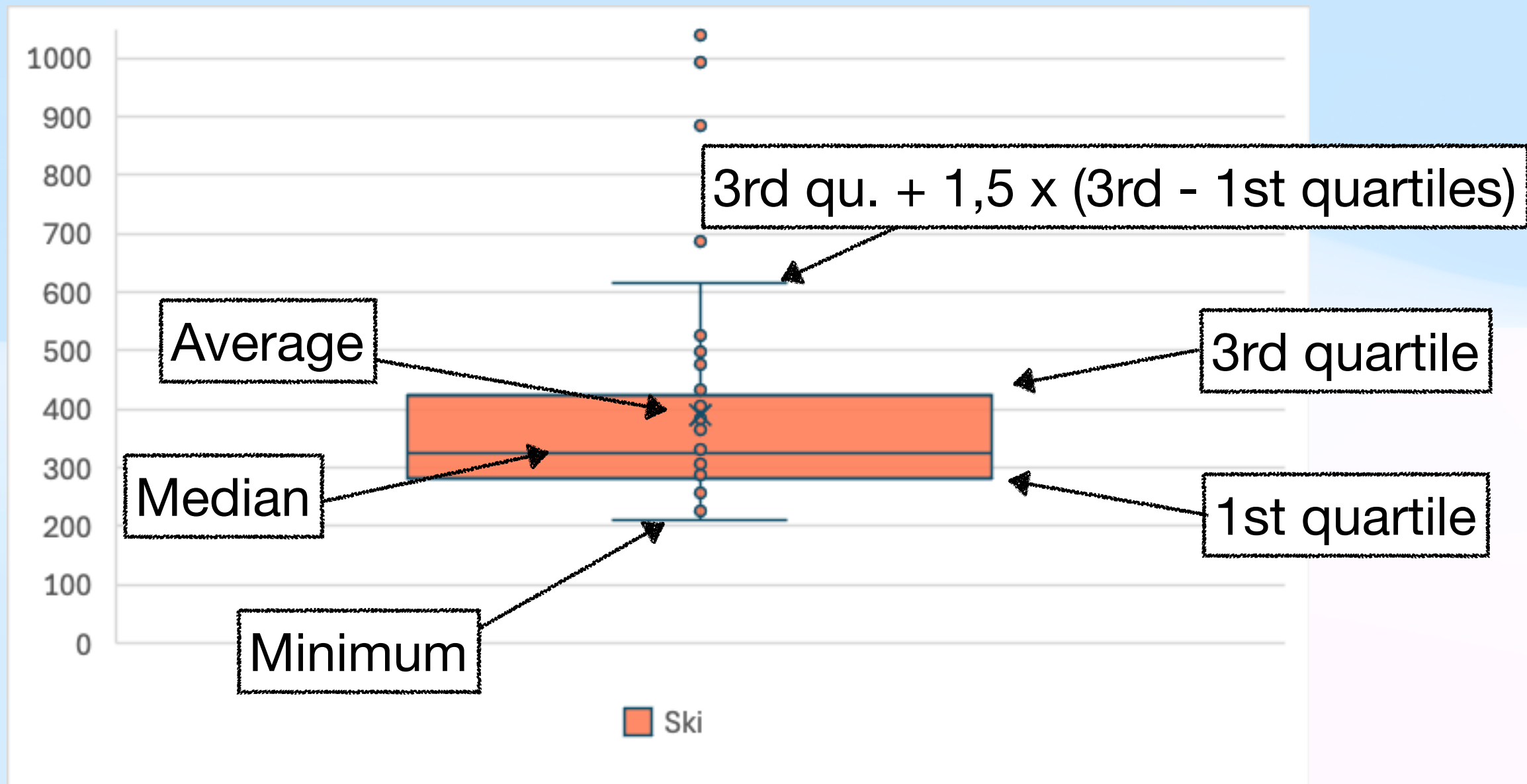
How to read a box plot

49 times for the vocable SKI



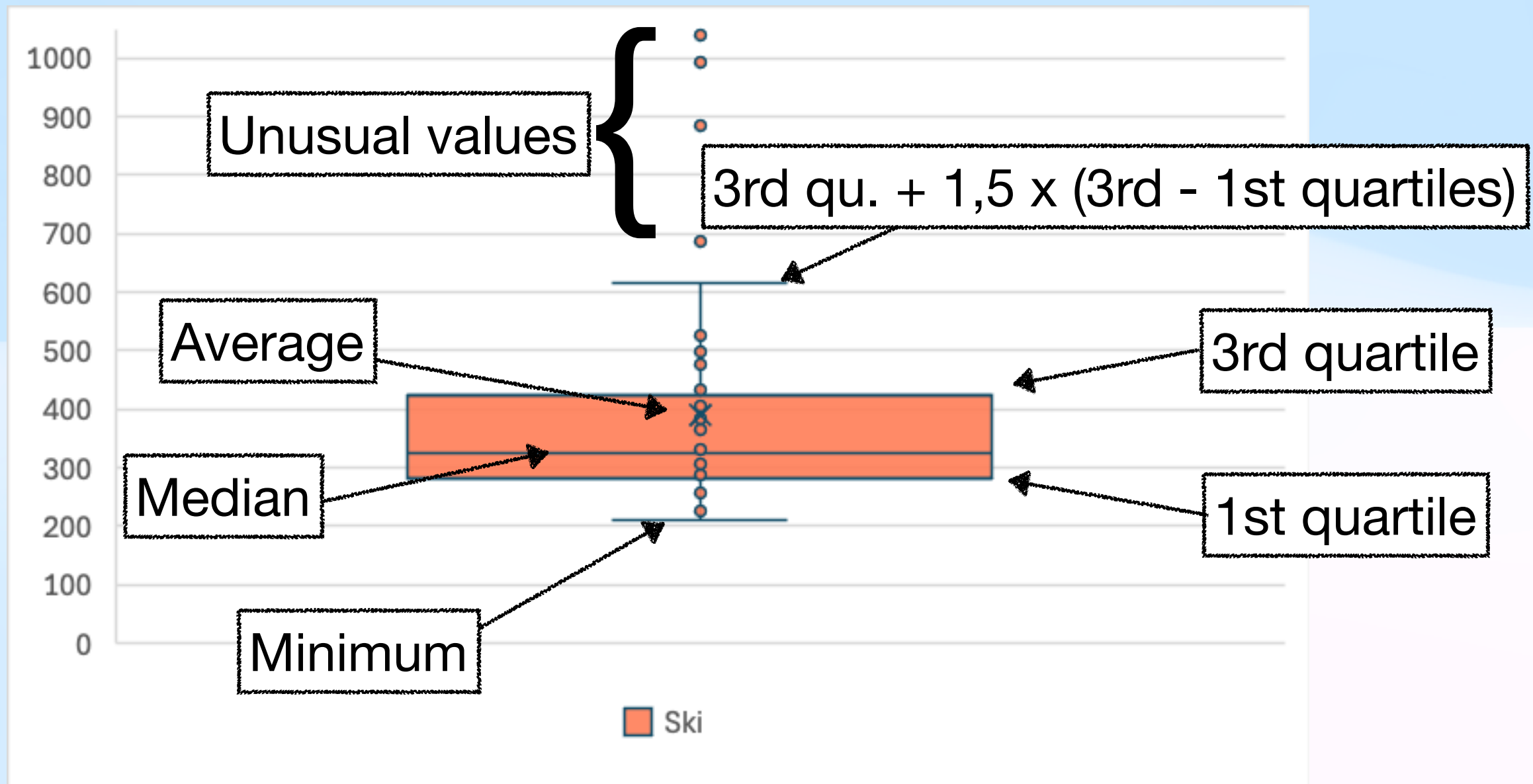
How to read a box plot

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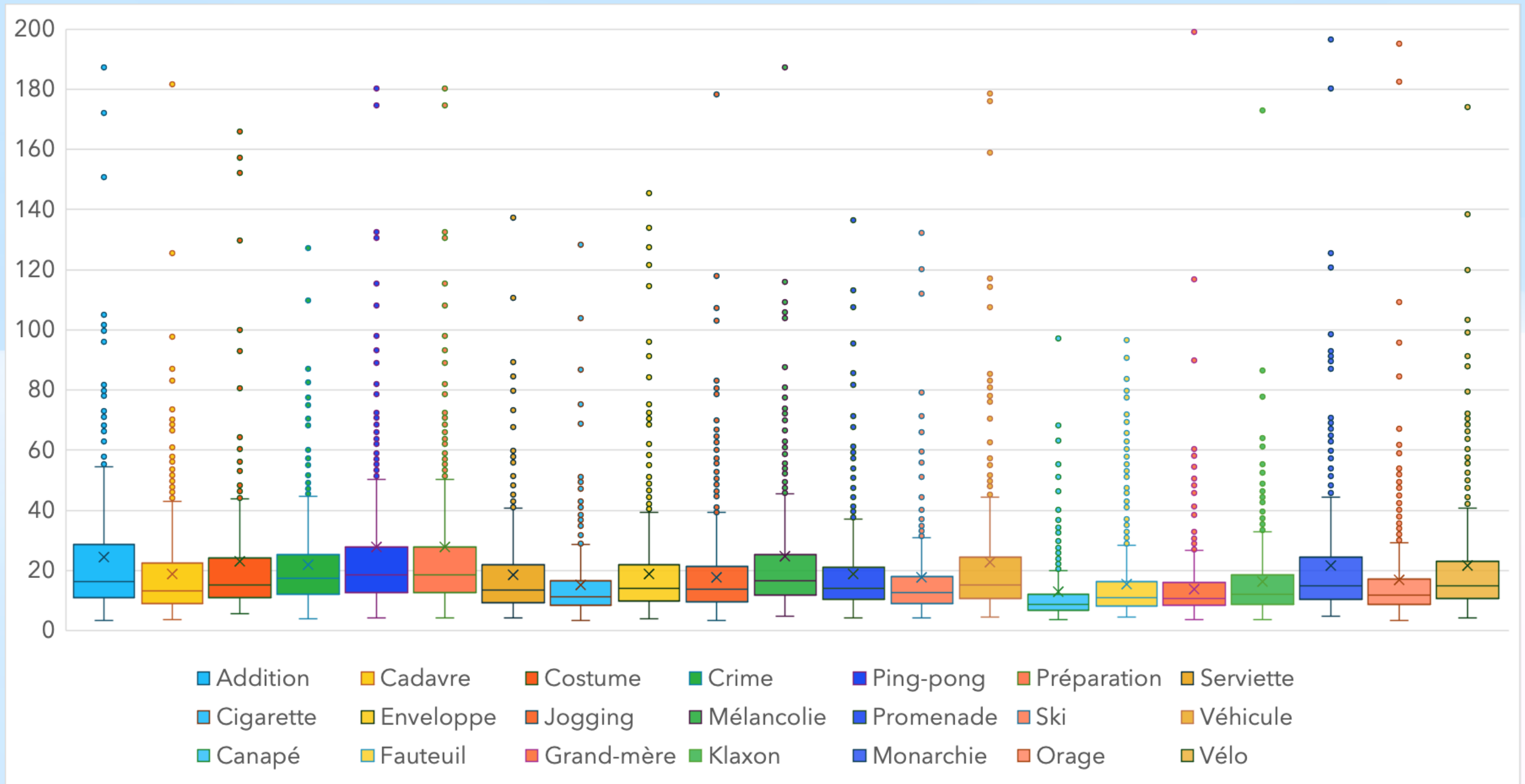
How to read a box plot

49 times for the vocable SKI



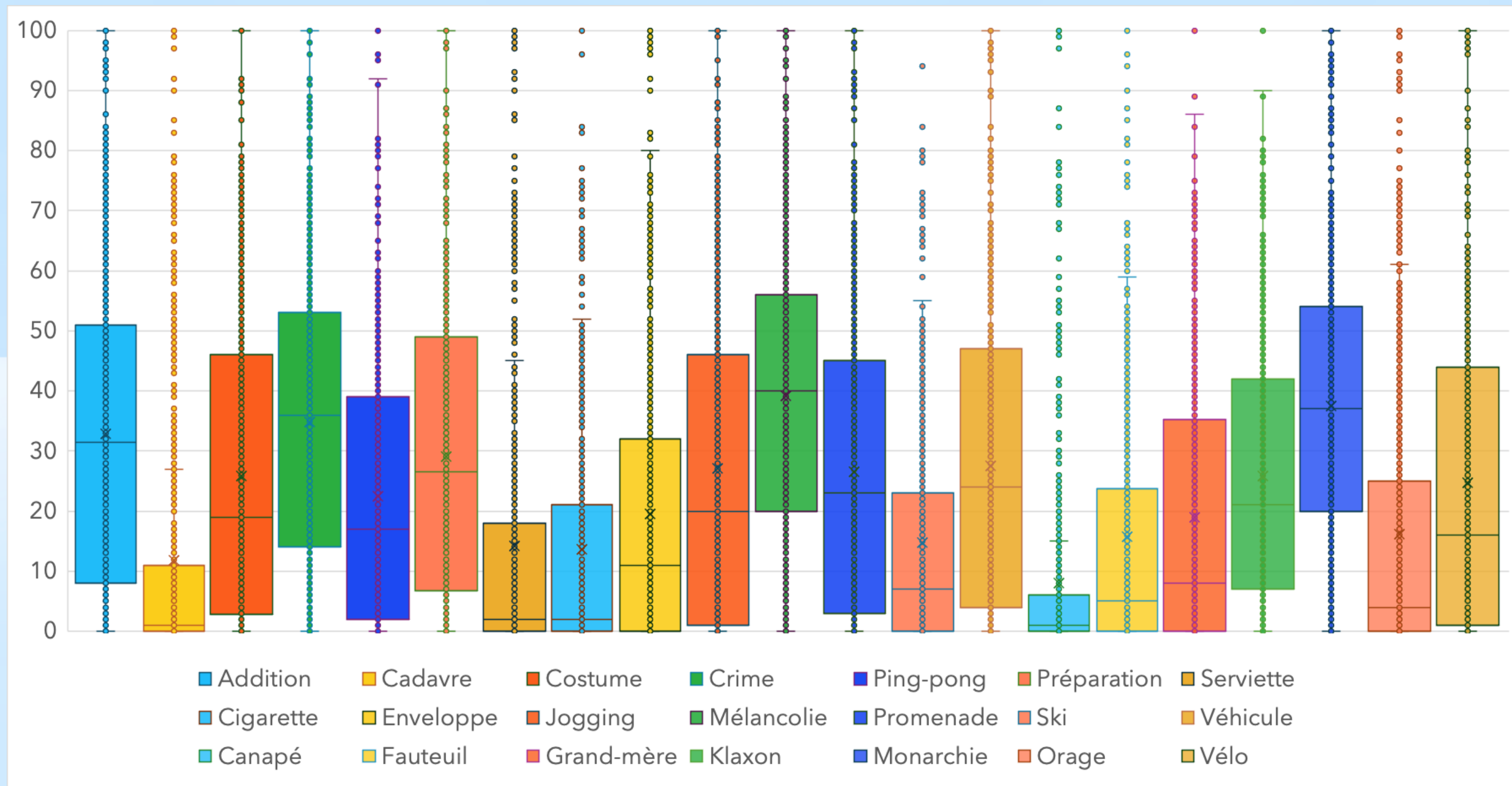
Annotation times

Per context, per vocable



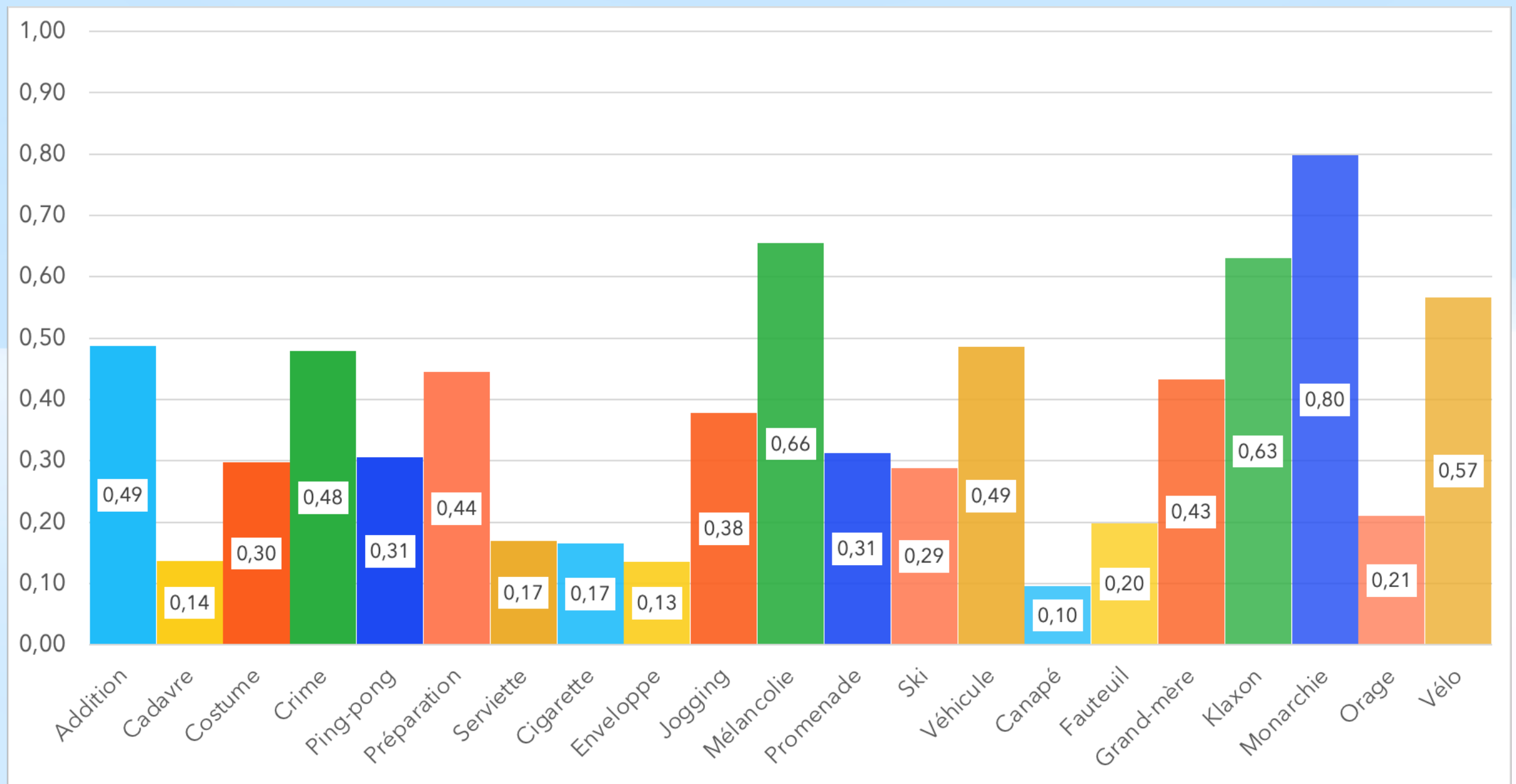
Perceived difficulty

Per context, per vocable



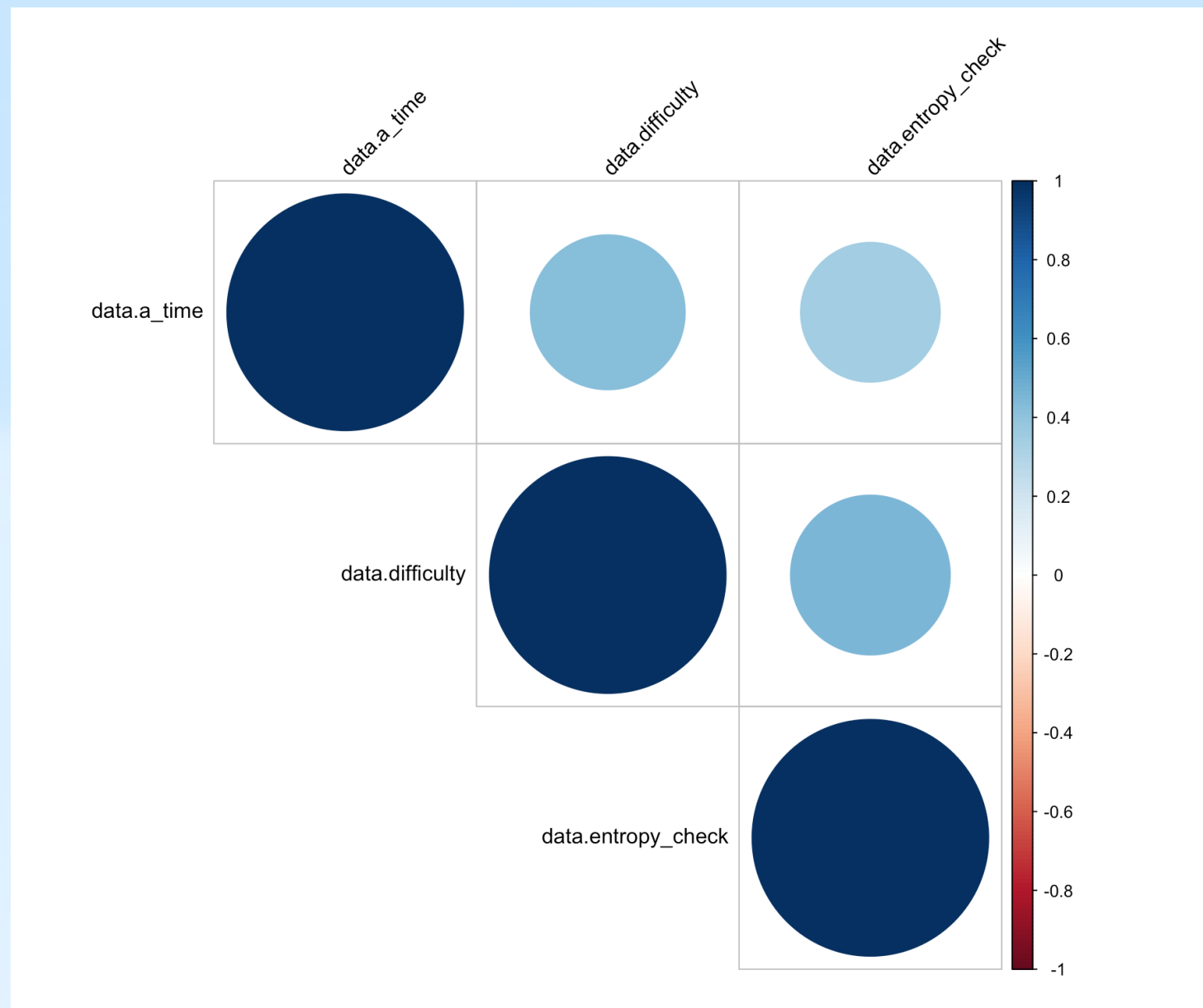
Annotation Shannon entropy

Average, per vocable

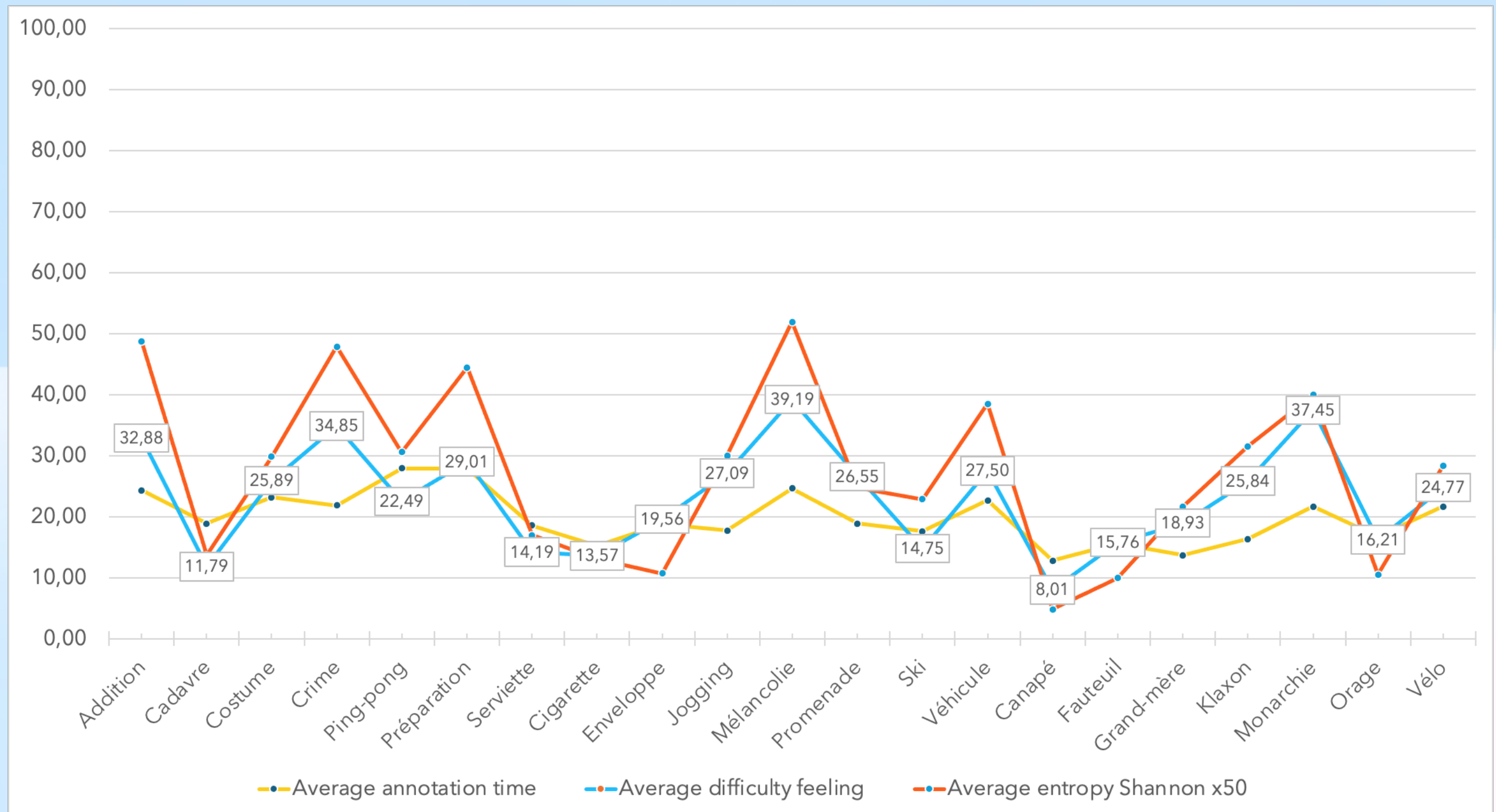


Time | Perceived Difficulty | Entropy

Correlation Spearman matrix



Time | Difficulty | Entropy



Our predictors

Our independent variables

Predictors linked to selection of vocables

- Degree of polysemy
 - 2, 3 or 4 different senses
- Sense entropy
 - Shannon entropy calculation based on quick manual annotation of 100 contexts in Sketch Engine
- Semantic distance between senses
 - based on semantic classes
 - based on polysemy relations
- Concreteness of vocables

Predictors linked with contexts selection

Improved measures

- Length of context
 - Excel =NBCAR()
- Distribution of senses evoked by LN-fr neighbours
- Frequency of Sketch Engine collocates
- Apparition probability by Masked language modelling

Future analyses

Quantitative analysis

Mixed-effects regression models

Linear mixed model fit by REML. t-tests use Satterthwaite's method ['lmerModLmerTest']

Formula: entropy_check ~ length_centered + cooc_sketch_centered + ratio_cooc_sketch_centred +
polysemy_centered + entropy_sens_centered + dispersion_centered + prox_sem_centered + concreteness_centred + voisinage_rang1_2 +
ratio_voisinage_1_2_centered + prox_llm_proba_centered + (1 | vocable)

Data: data

REML criterion at convergence: 13369.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-2.53763	-0.62559	-0.07112	0.67198	2.98489

Random effects:

Groups	Name	Variance	Std.Dev.
vocable	(Intercept)	0.03783	0.1945
Residual		0.15443	0.3930

Number of obs: 13610, groups: vocable, 21

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t)	
(Intercept)	4.988e-01	4.353e-02	1.632e+01	11.461	3.21e-09	***
length_centered	-4.852e-05	3.685e-05	1.359e+04	-1.317	0.18798	
cooc_sketch_centered	1.010e-02	3.363e-03	1.349e+04	3.004	0.00267	**
ratio_cooc_sketch_centred	-4.793e-02	3.482e-02	1.360e+04	-1.377	0.16868	
polysemy_centered	-2.302e-02	8.398e-02	1.501e+01	-0.274	0.78773	
entropy_sens_centered	3.257e-01	1.509e-01	1.502e+01	2.158	0.04751	*
dispersion_centered	-9.029e-02	1.562e-01	1.501e+01	-0.578	0.57173	
prox_sem_centered	1.344e-01	1.611e-01	1.501e+01	0.835	0.41701	
concreteness_centred	-2.978e-01	1.451e-01	1.502e+01	-2.053	0.05792	.
voisinage_rang1_2plusieurs	3.939e-02	1.246e-02	1.359e+04	3.161	0.00158	**
voisinage_rang1_2un	6.445e-02	1.150e-02	1.359e+04	5.603	2.15e-08	***
ratio_voisinage_1_2_centered	-4.492e-01	7.563e-02	1.359e+04	-5.940	2.92e-09	***
prox_llm_proba_centered	8.413e-02	1.146e-02	1.360e+04	7.344	2.20e-13	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Qualitative analysis

COSTUME 4 senses

GS403215

La Batcave quant à elle, rassemblerait toutes sortes de choses intéressantes comme par exemple un mémorial autour du **costume** en lambeaux de Robin.

	24		m 44,17 s.		m 49,04			sens 1
							8	sens 2
							11	sens 3
			Me 24,115 s.				5	sens 4
						Entropy	1,52	

GS403225

Customisation de chapeau de sorcière et t-shirt, création de **costumes** de fantôme, de squelette ou invention d'un monstre unique sont des activités de DIY d'Halloween qui conviendront à vos grands enfants.

+								
	24		m 76,89 s.		m 5,54		24	sens 1
								sens 2
								sens 3
			Me 11,59s.		Me 3,5			sens 4
				Entropy		0		

Qualitative analysis

COSTUME 4 senses

GS403215

La Batcave quant à elle, rassemblerait toutes sortes de choses intéressantes comme par exemple un mémorial autour du **costume** en lambeaux de Robin.

3 senses

	24		m 44,17 s.		m 49,04		8	sens 1
			Me 24,115 s.		Me 49		11	sens 2
							5	sens 3
					Entropy		1,52	sens 4

GS403225

Customisation de chapeau de sorcière et t-shirt, création de **costumes** de fantôme, de squelette ou invention d'un monstre unique sont des activités de DIY d'Halloween qui conviendront à vos **grands** enfants.

1 sense

	24		m 76,89 s.		m 5,54		24	sens 1
			Me 11,59s.		Me 3,5			sens 2
								sens 3
					Entropy		0	sens 4

Qualitative analysis

COSTUME 4 senses

GS403215

La Batcave quant à elle, rassemblerait toutes sortes de choses intéressantes comme par exemple un mémorial autour du **costume** en lambeaux de Robin.

3 senses

	24		m 44,17 s.		m 49,04			sens 1
							8	sens 2
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					Me 49	Entropy	1,52	

GS403225

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1 sense

	24		m 76,89 s.		m 5,54		24	sens 1
								sens 2
								sens 3
								sens 4
			Me 11,59s.					

Qualitative analysis

COSTUME 4 senses

LLM 0,052

GS403215

La Batcave quant à elle, rassemblerait toutes sortes de choses intéressantes comme par exemple un mémorial autour du **costume** en lambeaux de Robin.

3 senses

	24		m 44,17 s.		m 49,04			sens 1
							8	sens 2
							11	sens 3
							5	sens 4
			Me 24,115 s.					

GS403225

Customisation de chapeau de sorcière et t-shirt, création de **costumes** de fantôme, de squelette ou invention d'un monstre unique sont des activités de DIY d'Halloween qui conviendront à vos **grands** enfants.

1 sense

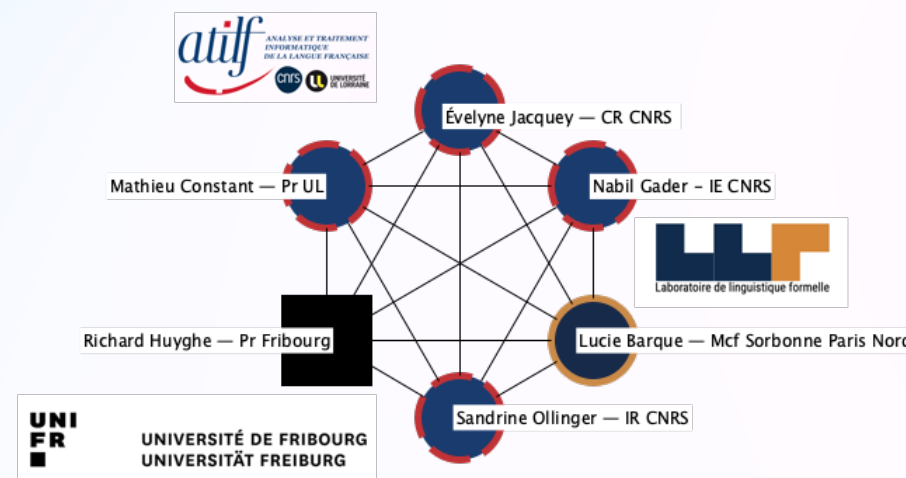
LLM 0,141

	24		m 76,89 s.		m 5,54		24	sens 1
								sens 2
								sens 3
								sens 4
			Entropy					
			Me 11,59s.		Me 3,5			

Conclusion

- First collaborative project for us
- Question of lexical sense
- Focus on annotation
- Focus on the role of context

ALUMCoCo



Grazie

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