

The Mirror Effect in SDT

Not another Recognition Memory study

PAPIIT IN307214

One single problem...

Is that the sound of a predator approaching?

Is this food eatable?

Is my mom mad at me?

Does this patient have an Anxiety Disorder?

Is there a bomb in this bag?

One single problem...

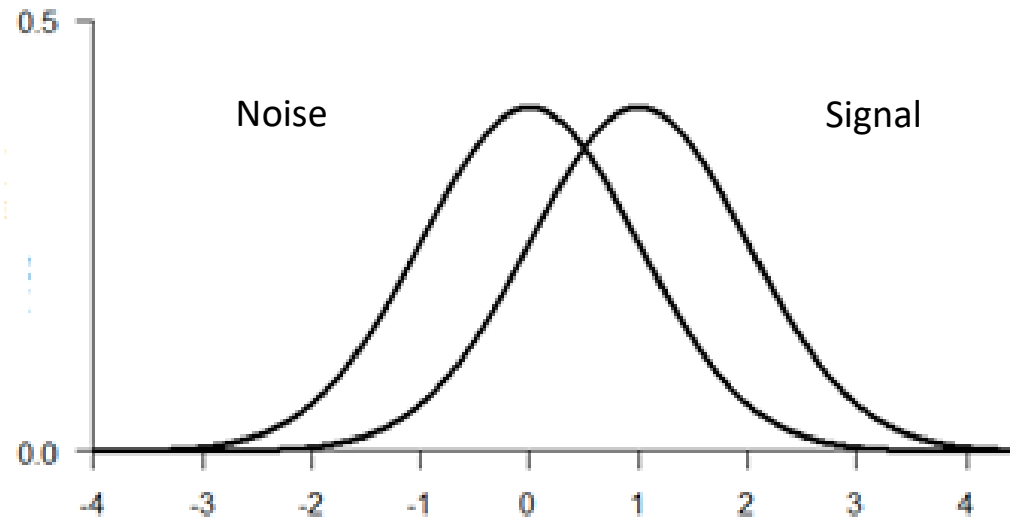
Is that the sound of a predator approaching?

Is this food edible?

Is my mom mad at me?

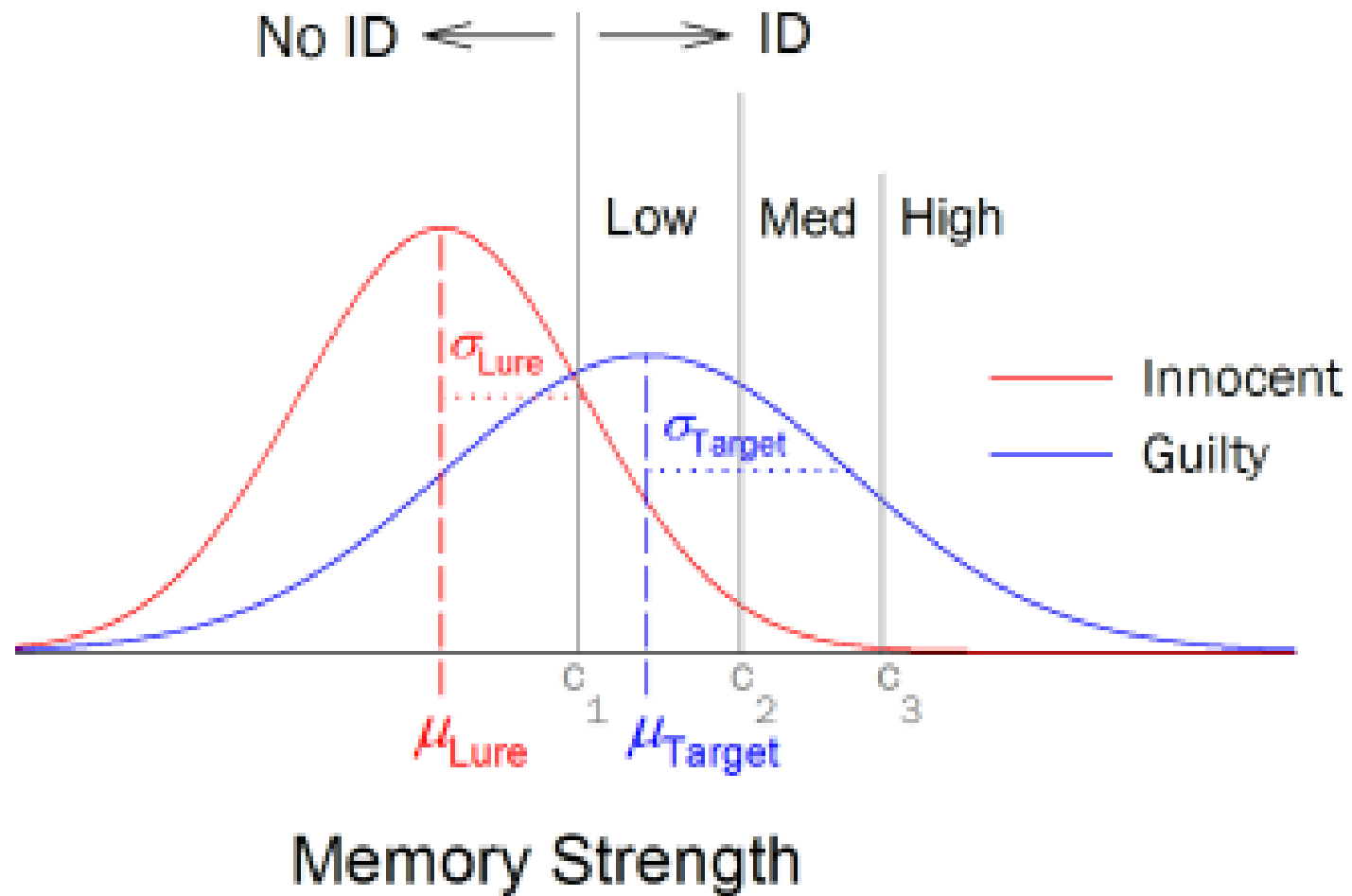
Is there a bomb in this bag?

Is the target stimulus present?



The Reliability of Eyewitness Identifications from Police Lineups

Wixted, Miickes, Dunn, Clark & Wells, 2016



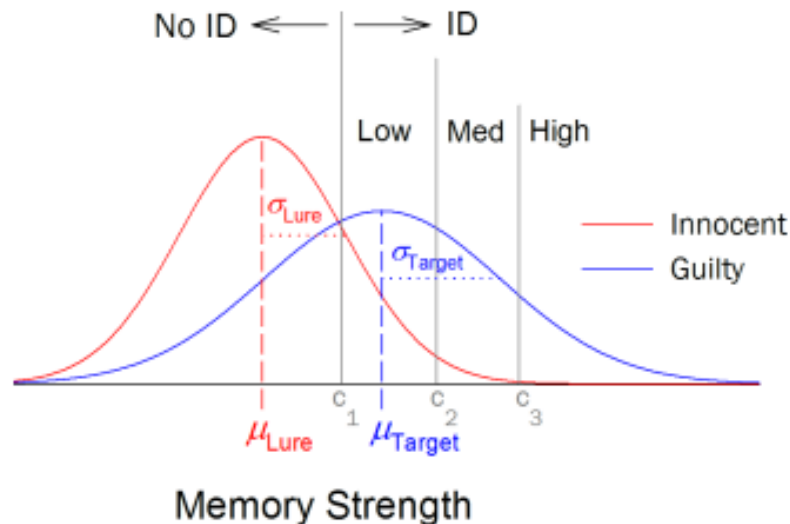
Recognition Memory

Study phase

- Incidental
- Intentional

Recognition Task

Have I seen this stimulus before?



Procedures

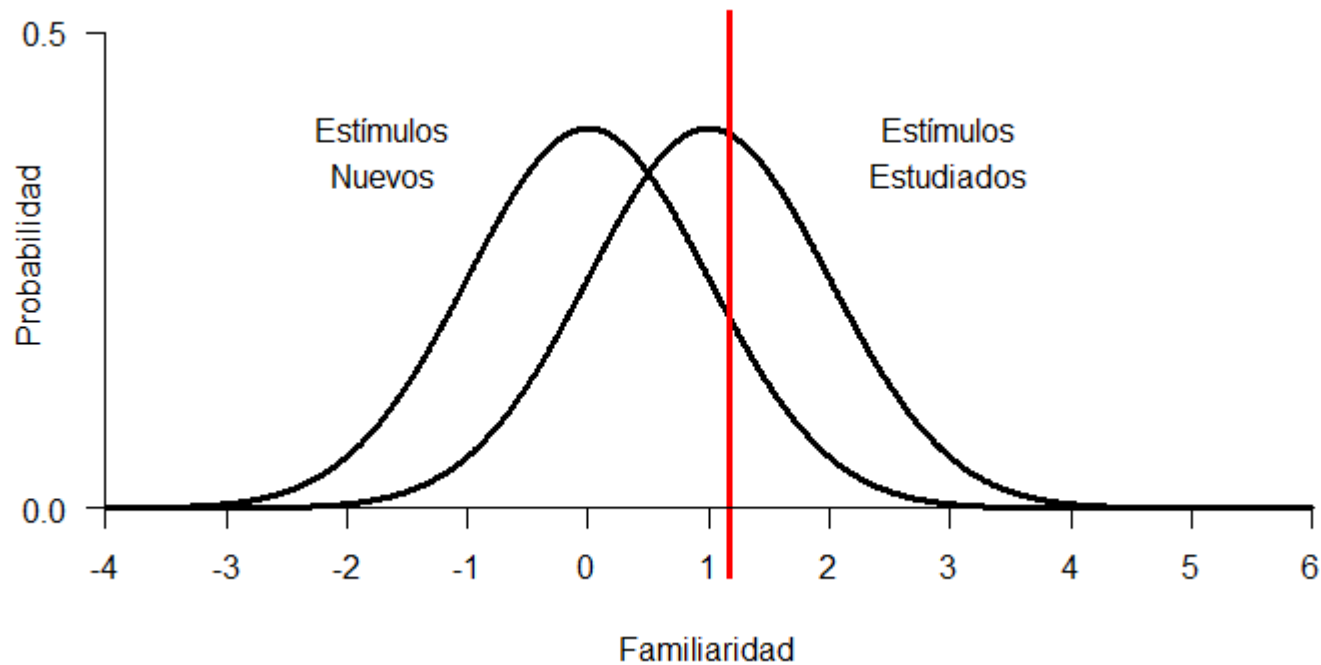
- 1. Yes | No Task
 - Have you seen this stimulus before?
- 2. Confidence Rating
 - How confident are you about your answer?

0	1	2	3	4	5
HIGH New	MEDIUM New	LOW New	LOW Old	MEDIUM Old	HIGH Old

1. Yes | No Task

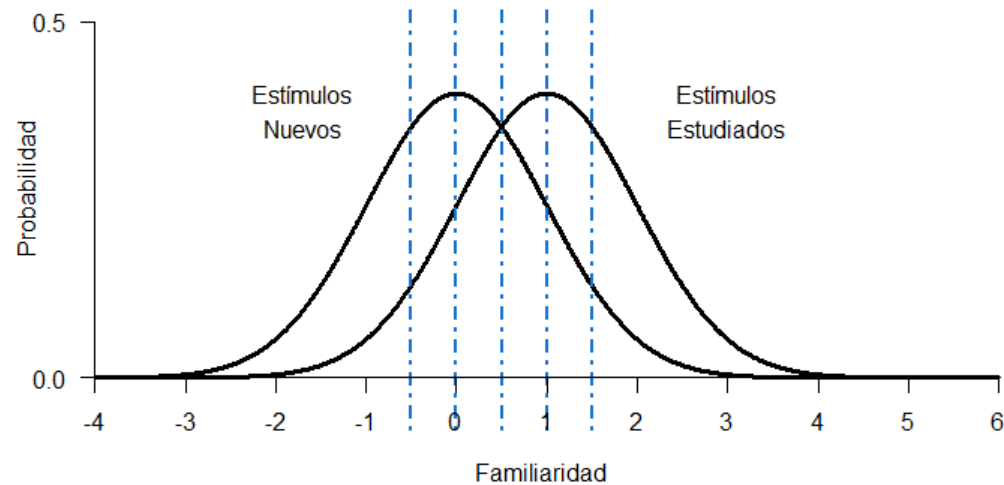
$p(\text{Hit})$

$p(\text{False Alarm})$

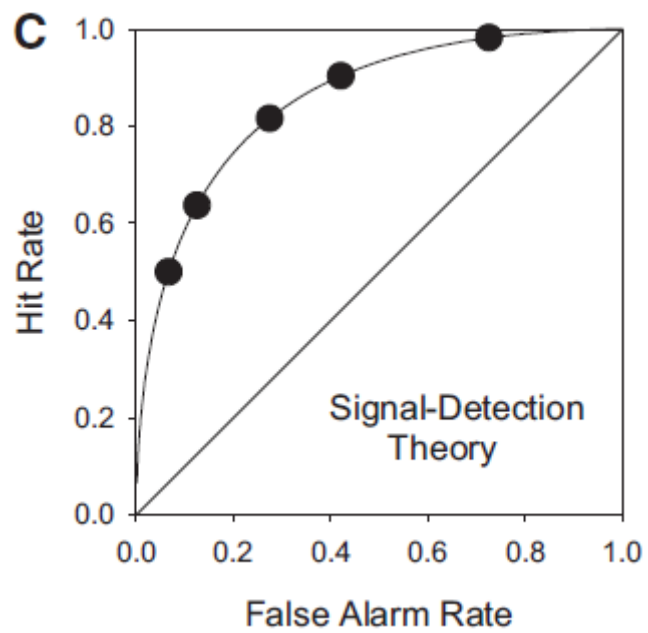
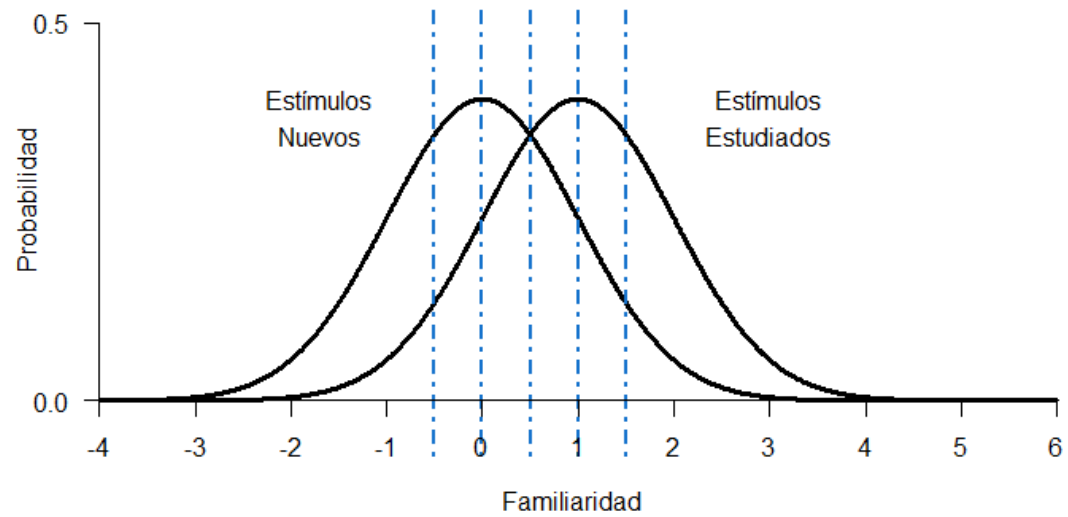


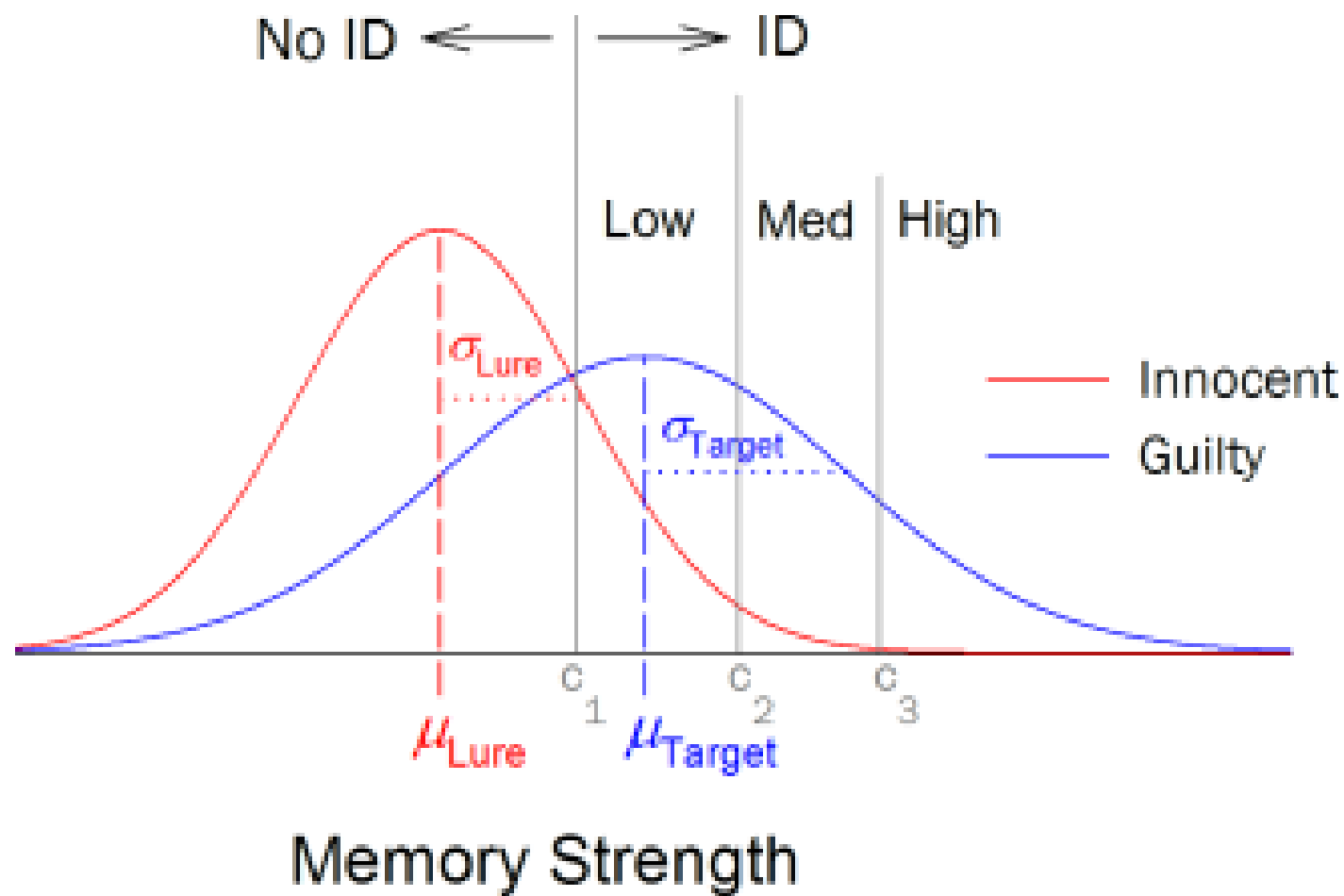
2. Confidence Rating

– Sub-criteria



Confidence Criterion	p(Hit)	p(FA)	D'
Old-High			1
Old-Medium			1
Old-Low			1
New-Low			1
New-Medium			1
New-High			1





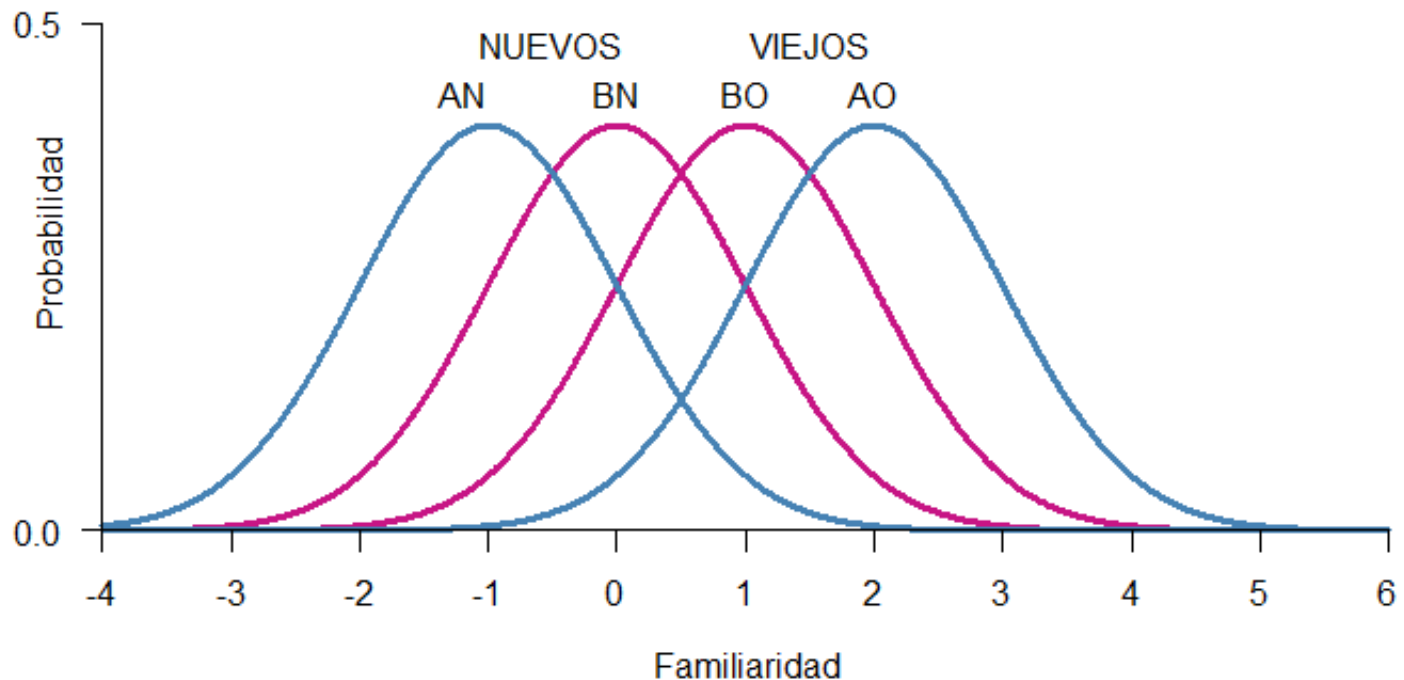
Mirror Effect

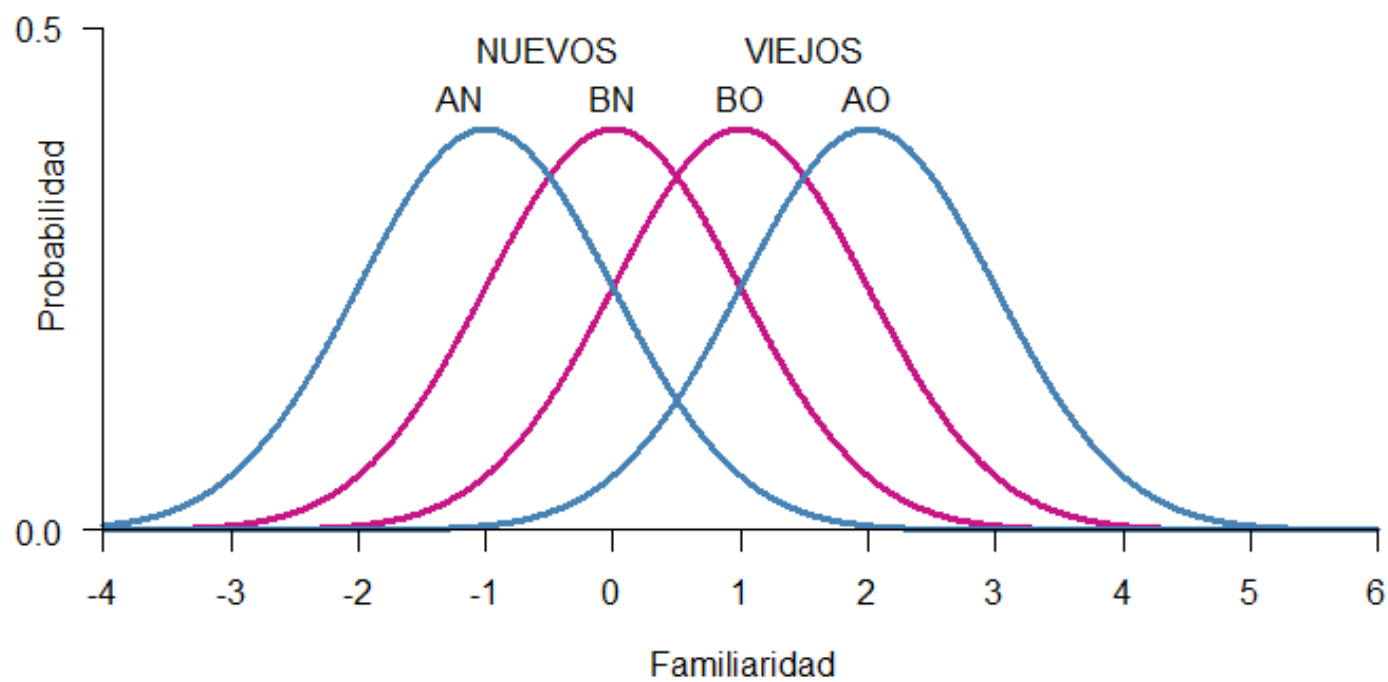
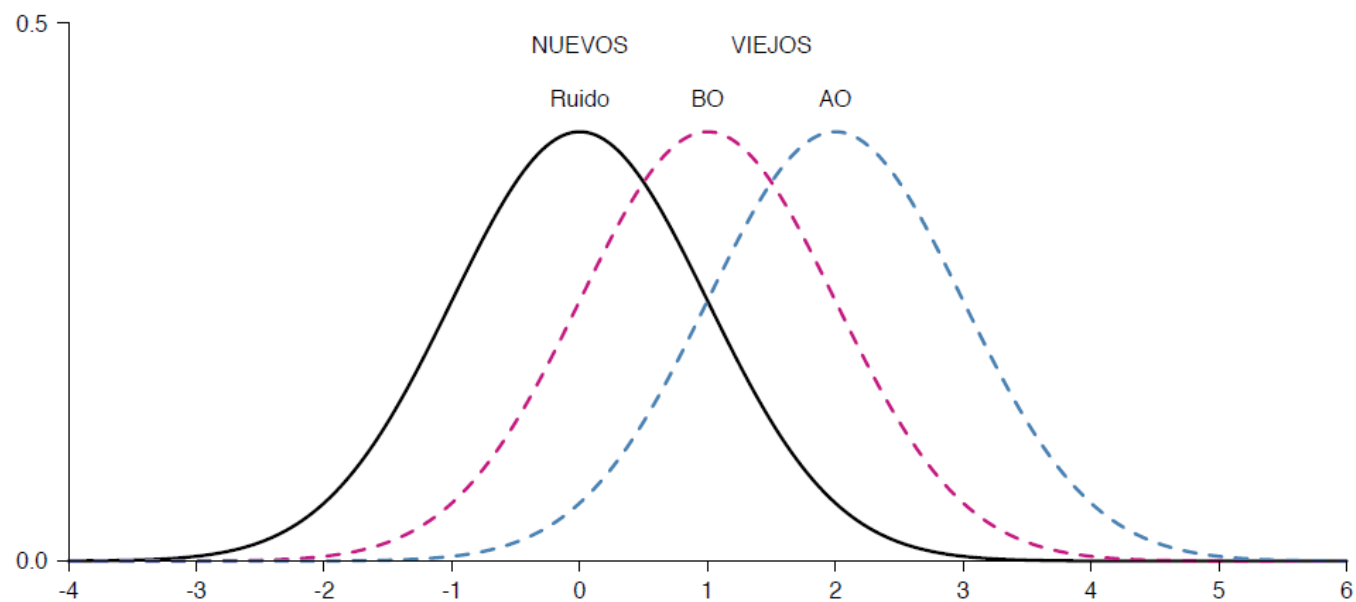
- “If there are two classes of stimuli, and one is more accurately recognized than the other, then the superior class is **both** more accurately recognized **as old when old** and also more accurately recognized **as new when new** (...) means that the greater efficiency in recognizing is always twofold”

(Glanzer, Adams, 1990)

Mirror Effect

- The greater efficiency in recognizing is always **twofold.**





Evidence

Yes/No
Procedure

$$fa(AN) < fa(BN) < h(BO) < h(AO),$$

Rate

Confidence
Rating

$$R(AN) < R(BN) < R(BO) < R(AO),$$

Mean

$$P(BO, BN) < P(BO, AN), P(AO, BN) < P(AO, AN),$$

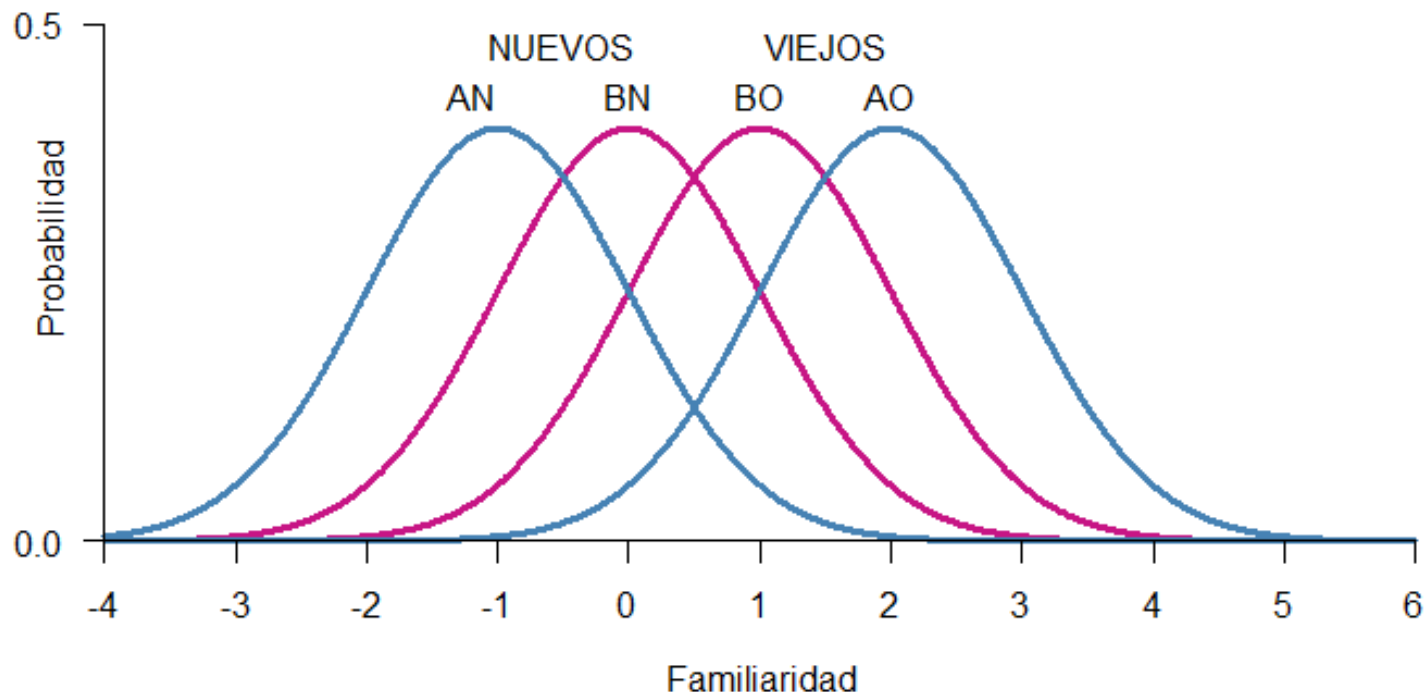
2AFC:

Preferences

Means for Proportion Yes (False Alarms and Hits) and for Confidence Ratings in an Experiment With Word Frequency as the Variable (Glanzer & Adams, 1990, Experiment 1; N = 16)

Example

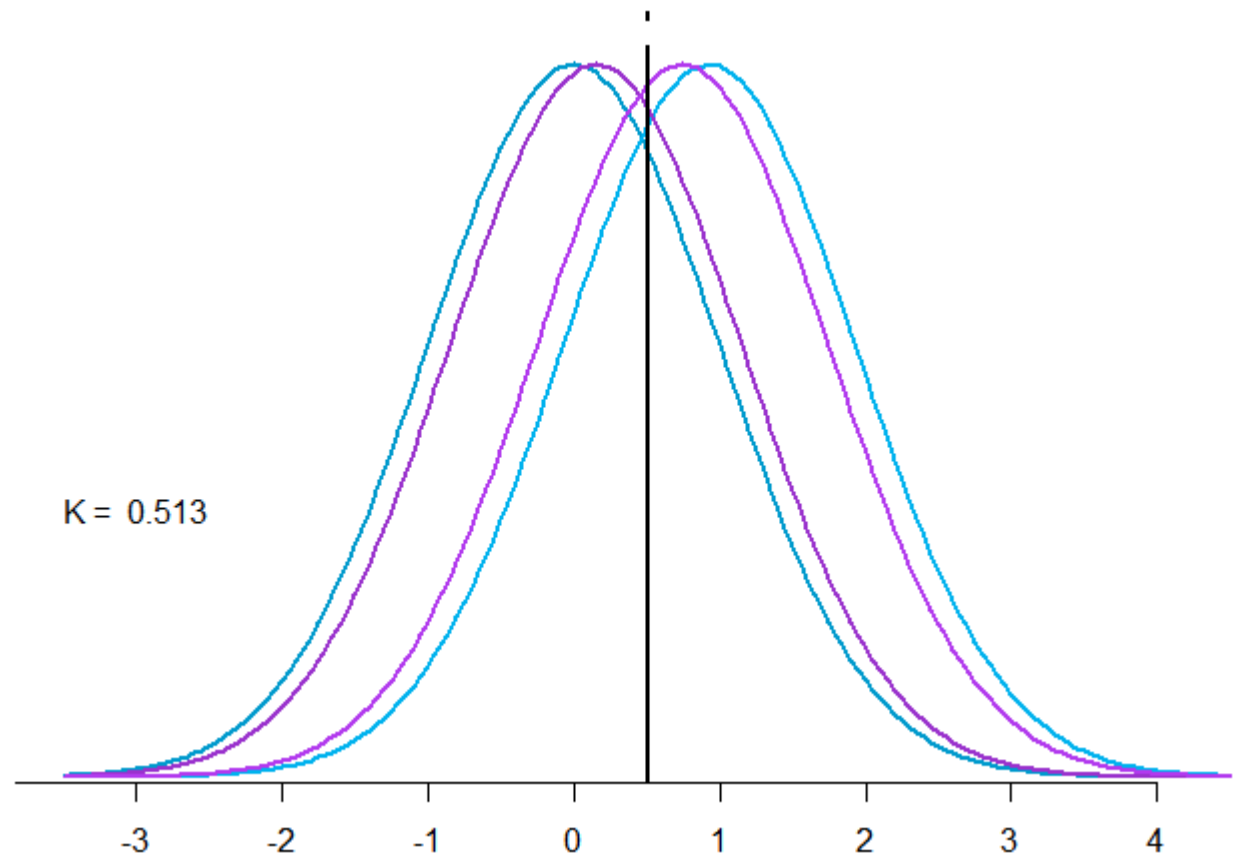
Measure	Condition			
	New		Old	
	Low	High	High	Low
$P(\text{yes})$.304	.359	.592	.661
Confidence rating	3.34	3.76	5.09	5.56



Means for Proportion Yes (False Alarms and Hits) and for Confidence Ratings in an Experiment With Word Frequency as the Variable (Glanzer & Adams, 1990, Experiment 1; N = 16)

Example

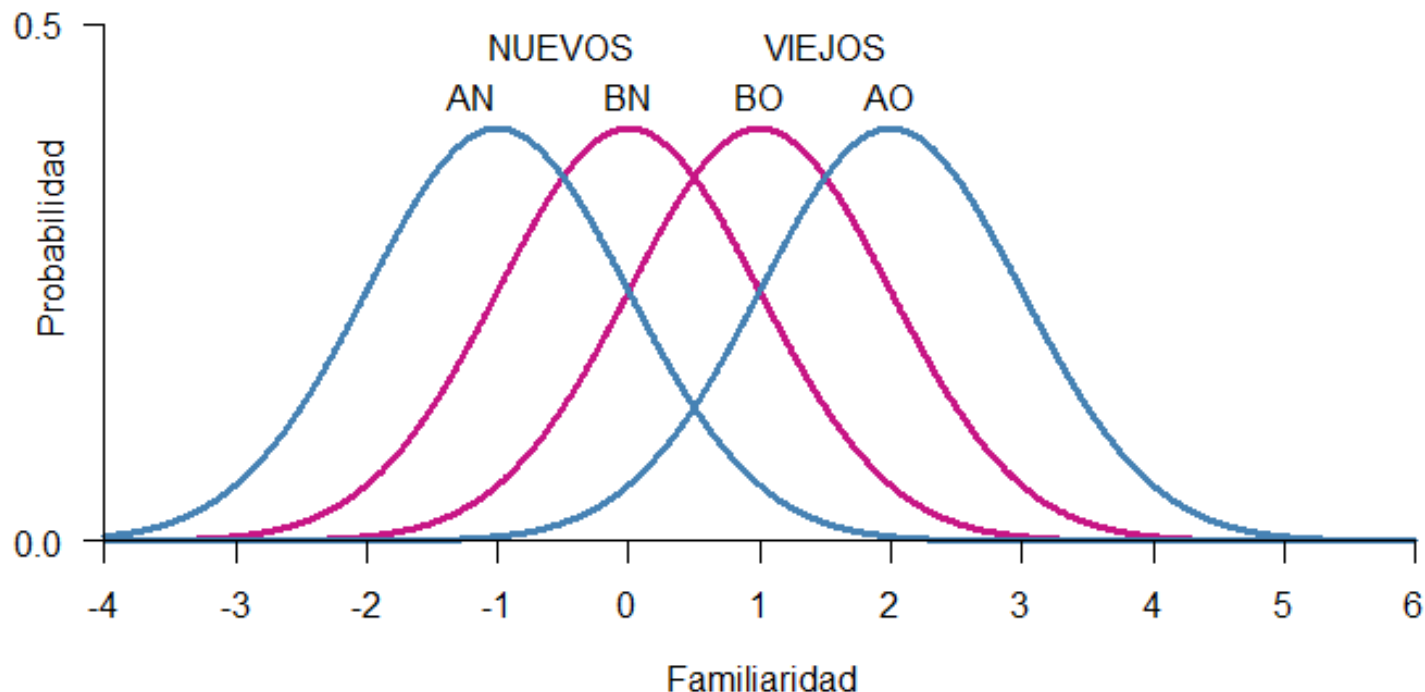
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Means for Proportion Yes (False Alarms and Hits) and for Confidence Ratings in an Experiment With Word Frequency as the Variable (Glanzer & Adams, 1990, Experiment 1; N = 16)

Example

Measure	Condition			
	New		Old	
	Low	High	High	Low
<i>P</i> (yes)	304	359	592	661
Confidence rating	3.34	3.76	5.09	5.56



Ejemplo (Glanzer and Bowles, 1976)

Table 2

Mean Proportions of Choice in an Experiment With Word Frequency as the Variable, Using Forced Choice (Glanzer & Bowles, 1976; N = 48)

Choice					
Null pairs		Standard pairs			
$P(\text{HN}, \text{LN})$	$P(\text{LO}, \text{HO})$	$P(\text{HO}, \text{HN})$	$P(\text{LO}, \text{HN})$	$P(\text{HO}, \text{LN})$	$P(\text{LO}, \text{LN})$
.67	.68	.75	.80	.83	.89

Note. Columns are arranged to show the mirror inequalities for the standard pairs in the four columns on the right: $P(\text{HO}, \text{HN}) < P(\text{LO}, \text{HN})$, $P(\text{HO}, \text{LN}) < P(\text{LO}, \text{LN})$. The null pairs on the left should both be above .50 when the mirror order holds. P = proportion; HN = high frequency, new; LN = low frequency, new; LO = low frequency, old; HO = high frequency, old. Adapted from "Analysis of the Word-Frequency Effect in Recognition Memory" by M. Glanzer and N. Bowles, 1976, *Journal of Experimental Psychology: Human Learning and Memory*, 2, p. 24. Copyright 1976 by the American Psychological Association.

2Alternative-ForcedChoice

- **Standard comparisons**

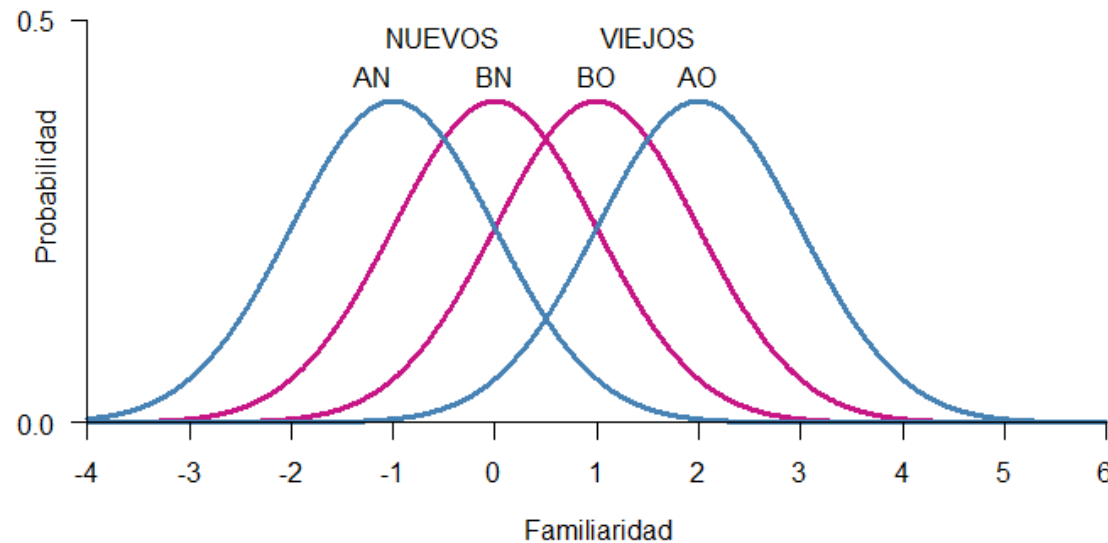
AO – AN
- BN

BO – AN
- BN

Null Choices

AN – BN

AO - BO



Multiplicity

“The experimenter can produce as many separate mirror orders within a single data set as wished. All that has to be done is to impose effective variables factorially on the presented material and have a sufficient number of items in the study list.”

Extensiveness

“When two variables are used in a single experiment (...) produce an array of eight underlying distributions in mirror order”.

		Frequency	
		Low	High
Concreteness	Concrete	LC	HC
	Unconcrete	LU	HU

$$fa(LCN) < fa(HCN) < fa(LUN) < fa(HUN) < h(HUO) < h(LUO) < h(HCO) < h(LCO).$$

- The Mirror Effect has only been studied within Recognition Memory.
 - Can we find the Mirror Effect in other areas where SDT has been applied?

Experiments



¡Bienvenido(a)!

Presiona la barra espaciadora para comenzar con las instrucciones



Instrucciones

En la pantalla se te mostraran dos círculos en color claro cuyo tamaño deberás comparar. El círculo del lado izquierdo permanecerá aislado, como referencia. El círculo del lado derecho aparecerá rodeado de un conjunto de círculos de distinto tamaño

Presiona la **Tecla S** cuando los círculos claros SÍ sean del mismo tamaño.

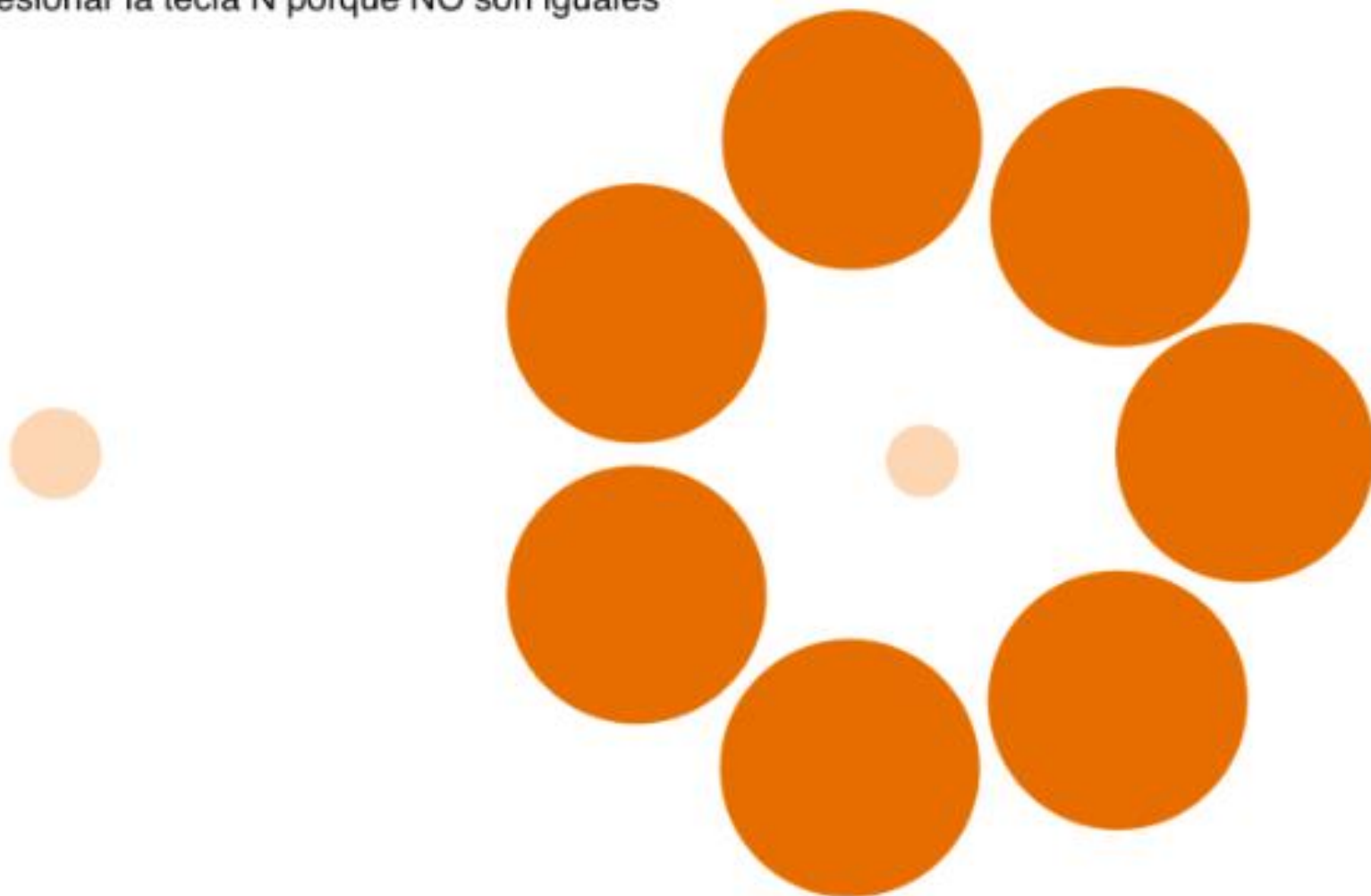
Presiona la **Tecla N** si NO son iguales.

Presiona la barra espaciadora para continuar.

Por ejemplo:

En este caso el círculo claro de la figura derecha (el círculo central) es mas chico que el círculo aislado del lado izquierdo.

Deberias presionar la tecla N porque NO son iguales



Presiona N

Posteriormente, se te presentara una escala como la siguiente:

1	2	3
Poco seguro (a)	Más o menos seguro (a)	Muy seguro (a)

Deberas teclear el numero 1, 2 o el 3, dependiendo de que tan seguro estas de tu respuesta.

Presiona la barra espaciadora para continuar

Cada pareja a comparar se te mostrará solo por un segundo.

No avanzarás al siguiente ensayo hasta que registres tus respuesta.

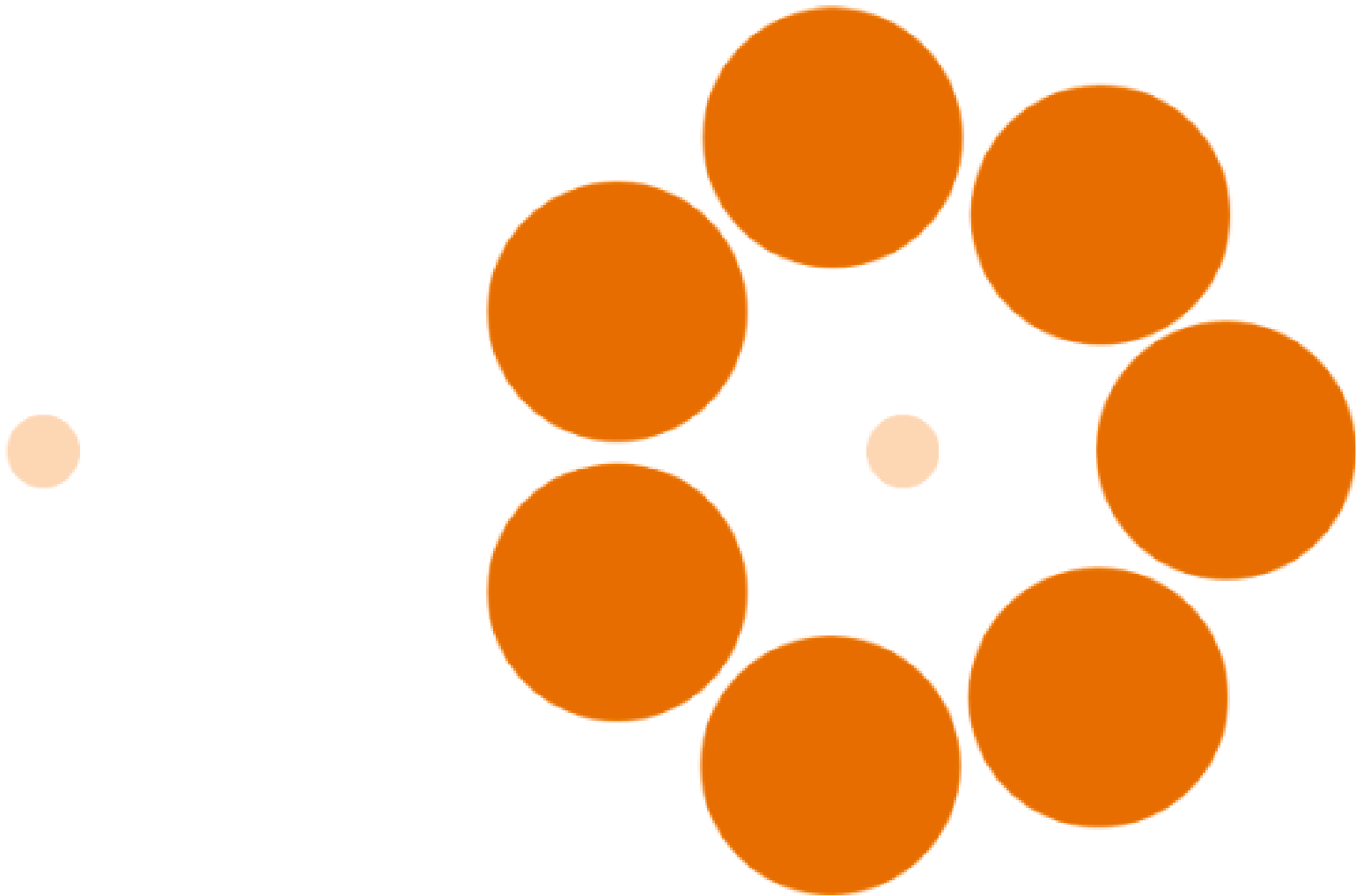
Una vez se registren tus respuestas, se te pedirá que indiques con la barra espaciadora cuando estés listo(a) para avanzar al siguiente ensayo.

Los estímulos se te presentaran en varios colores para facilitar la distinción entre ensayos. Los colores **no están correlacionados** de ninguna forma con nada.

Presiona la barra espaciadora para continuar.

Presiona la barra espaciadora para comenzar el experimento

¿Los círculos centrales son del mismo tamaño?



S = Si

N = No

¿Los círculos centrales son del mismo tamaño?

S = Si

N = No

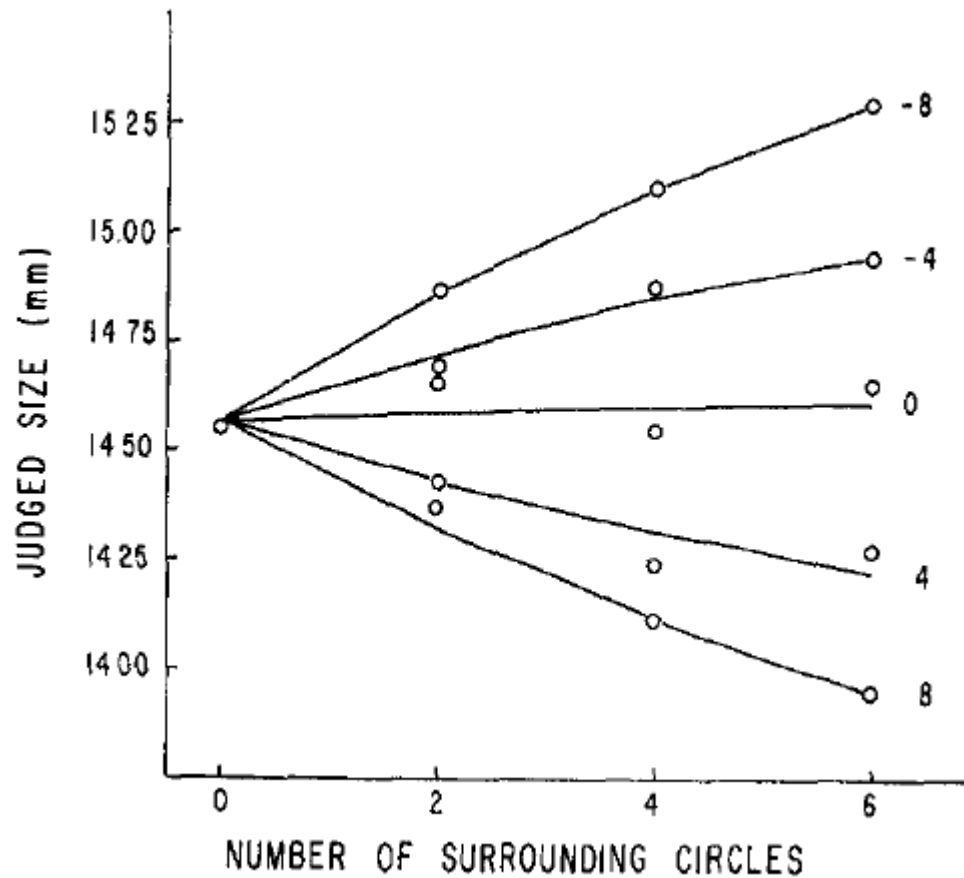
¿Qué tan seguro estás de tu
respuesta?

1	2	3
Poco seguro (a)	Más o menos seguro (a)	Muy seguro (a)

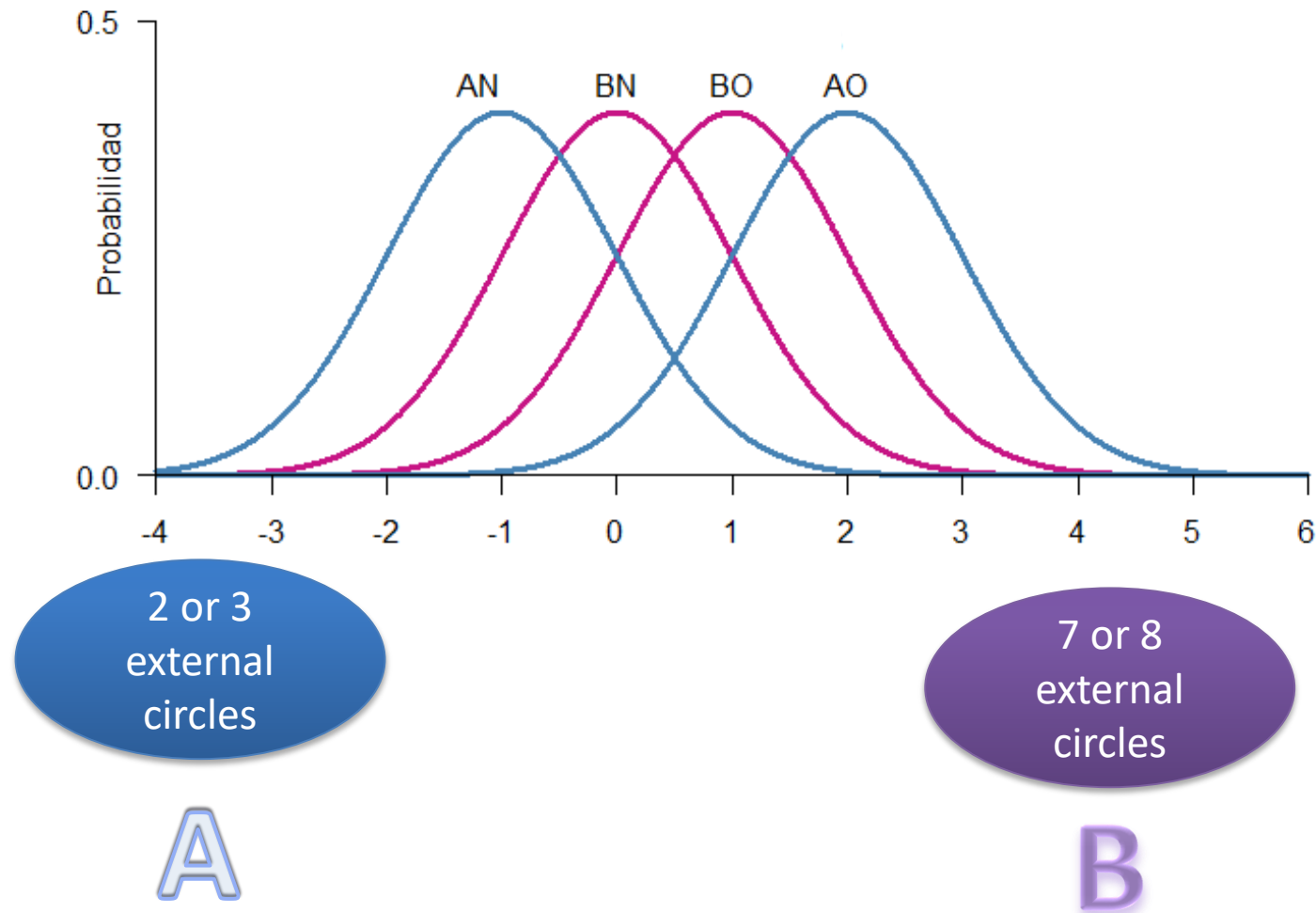
Presiona la barra espaciadora para avanzar al siguiente ensayo.

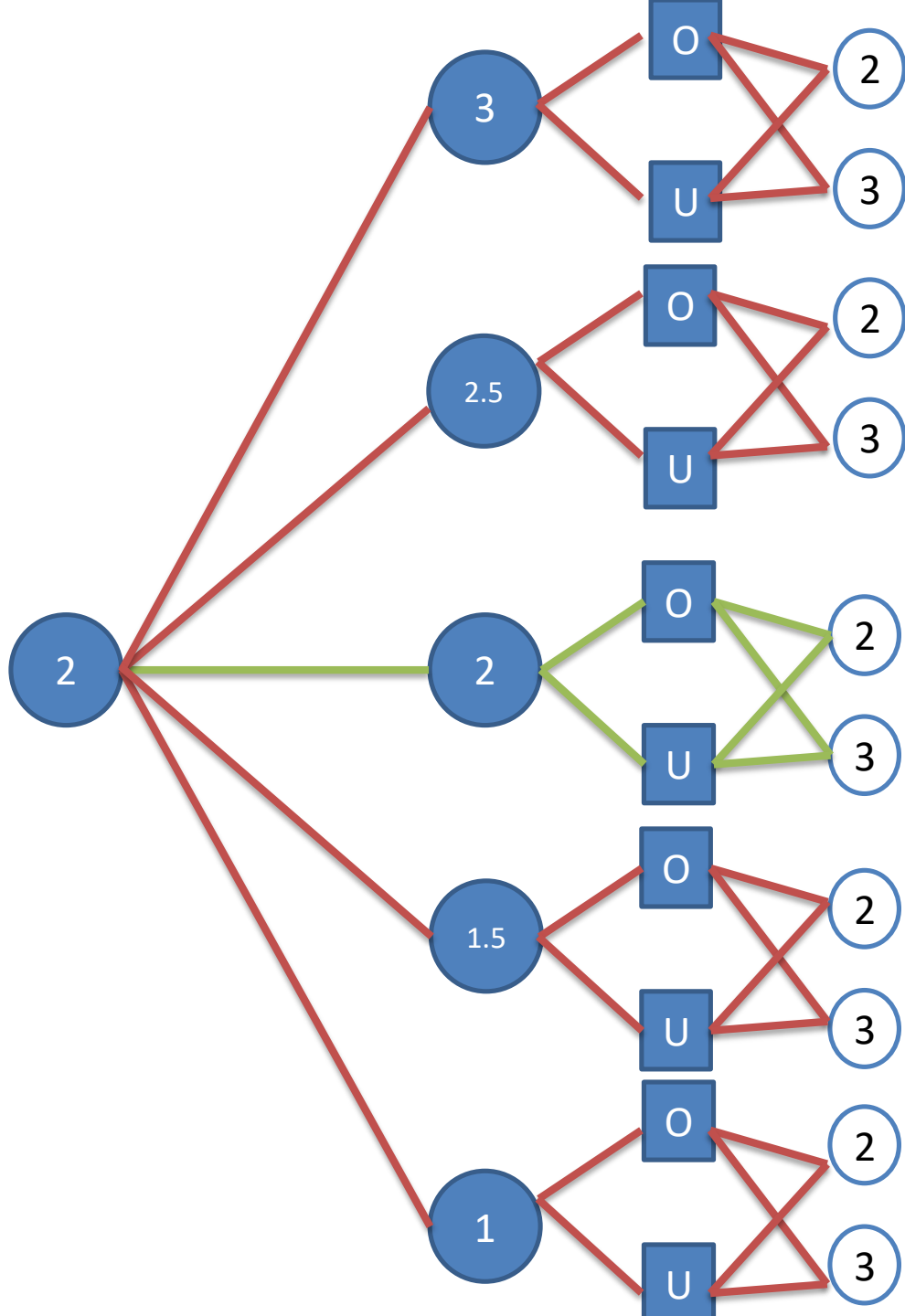
U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
Ensayo	Estimulo	Respuesta	Correcto	Aciertos	Errores	Hits	ContadorH	Rechazos	ContadorR	Falsas.al	ContadorF	Omisiones	ContadorM	Confidence	RTime1	RTime1b	RTime2
0	447	s	True	1	0	True	1	False	0	False	0	False	0	4	5.74549	4.244905	2.70672
1	164	n	True	2	0	False	1	True	1	False	0	False	0	1	2.93766	1.436569	1.90496
2	605	n	True	3	0	False	1	True	2	False	0	False	0	2	3.84011	2.339579	1.50382
3	112	s	True	4	0	True	2	False	2	False	0	False	0	6	2.83766	1.336874	2.50649
4	16	s	True	5	0	True	3	False	2	False	0	False	0	5	2.93824	1.437917	1.00411
5	203	n	True	6	0	False	3	True	3	False	0	False	0	3	3.33915	1.838339	1.30351
6	88	s	True	7	0	True	4	False	3	False	0	False	0	4	3.23876	1.737904	1.50368
7	429	n	False	7	1	False	4	False	3	False	0	True	1	2	3.8401	2.339303	1.40358
8	385	s	True	8	1	True	5	False	3	False	0	False	1	5	3.13901	1.638153	2.70653
9	307	n	True	9	1	False	5	True	4	False	0	False	1	1	2.838	1.337316	1.50445
10	558	s	False	9	2	False	5	False	4	True	1	False	1	5	2.83727	1.336863	0.70183
11	87	n	False	9	3	False	5	False	4	False	1	True	2	3	4.24095	2.739905	0.80222
12	71	s	True	10	3	True	6	False	4	False	1	False	2	6	3.13815	1.63787	1.90476
13	607	n	True	11	3	False	6	True	5	False	1	False	2	1	2.53716	1.036293	0.90252
14	98	s	True	12	3	True	7	False	5	False	1	False	2	6	2.43641	0.935281	1.9048
15	137	s	True	13	3	True	8	False	5	False	1	False	2	6	2.83797	1.337504	1.50382
16	100	n	False	13	4	False	8	False	5	False	1	True	3	2	2.7371	1.236629	1.00237
17	449	n	False	13	5	False	8	False	5	False	1	True	4	2	4.04108	2.540127	0.40119
18	493	n	True	14	5	False	8	True	6	False	1	False	4	3	2.33724	0.836374	0.30076
19	295	n	True	15	5	False	8	True	7	False	1	False	4	3	1.83559	0.334703	0.40122
20	194	n	True	16	5	False	8	True	8	False	1	False	4	2	4.24083	2.740342	0.40131
21	165	n	True	17	5	False	8	True	9	False	1	False	4	1	3.13855	1.637405	1.20461
22	532	s	False	17	6	False	8	False	9	True	2	False	4	5	2.43688	0.936097	0.80209
23	220	n	True	18	6	False	8	True	10	False	2	False	4	3	4.24203	2.741081	0.3007
24	273	n	True	19	6	False	8	True	11	False	2	False	4	1	2.73744	1.236548	0.40107

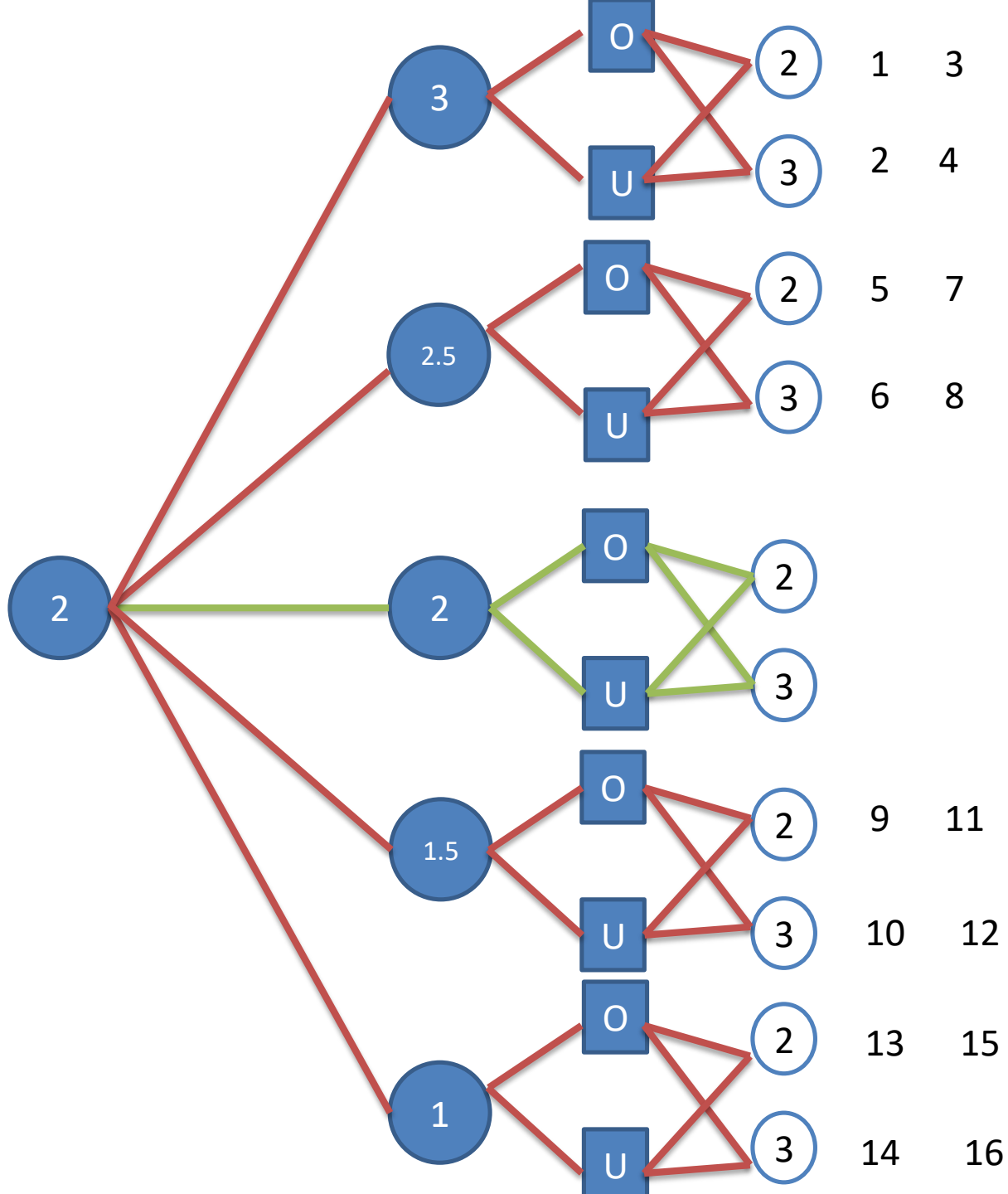
Looking for the Mirror Effect: A & B

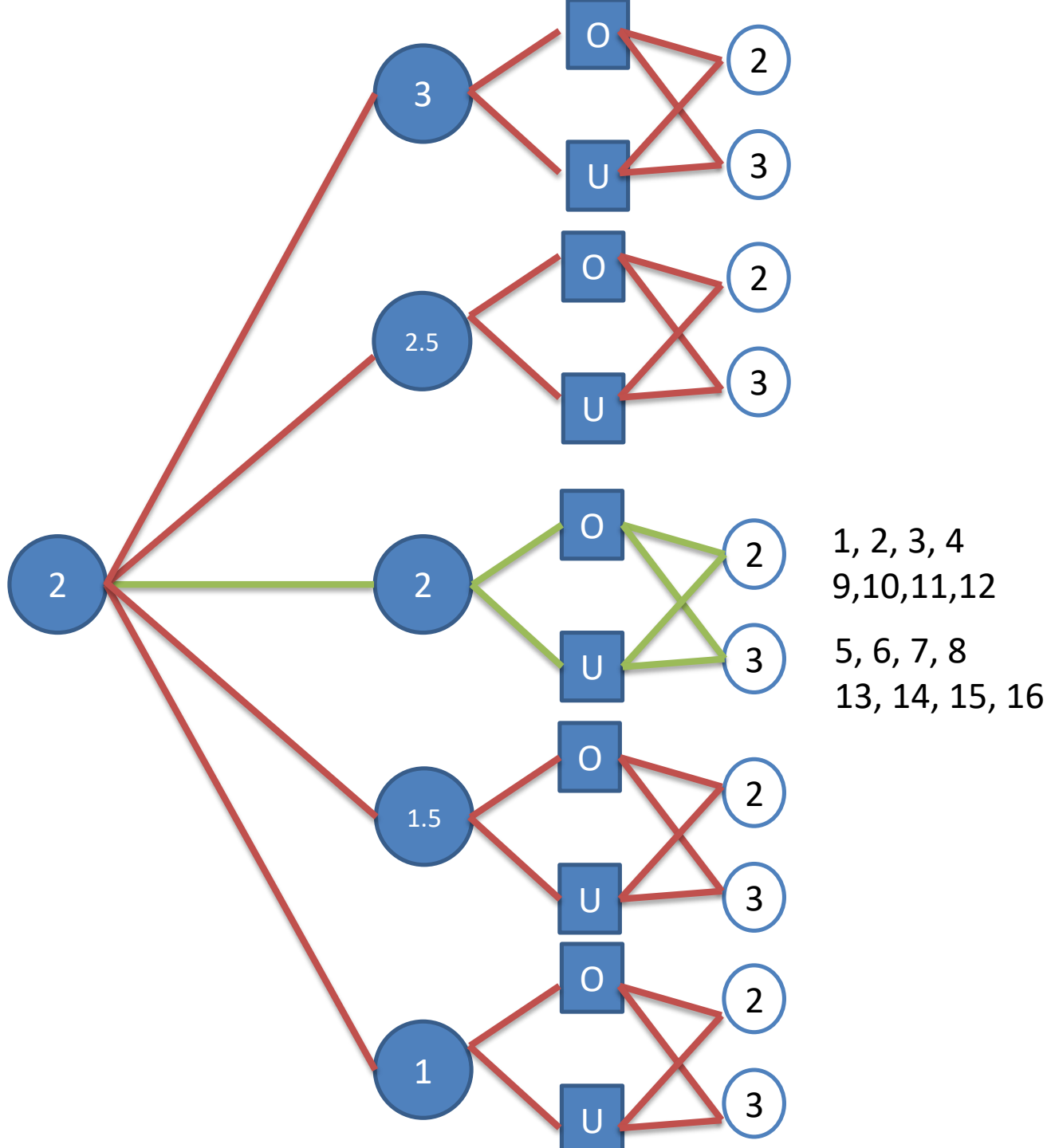


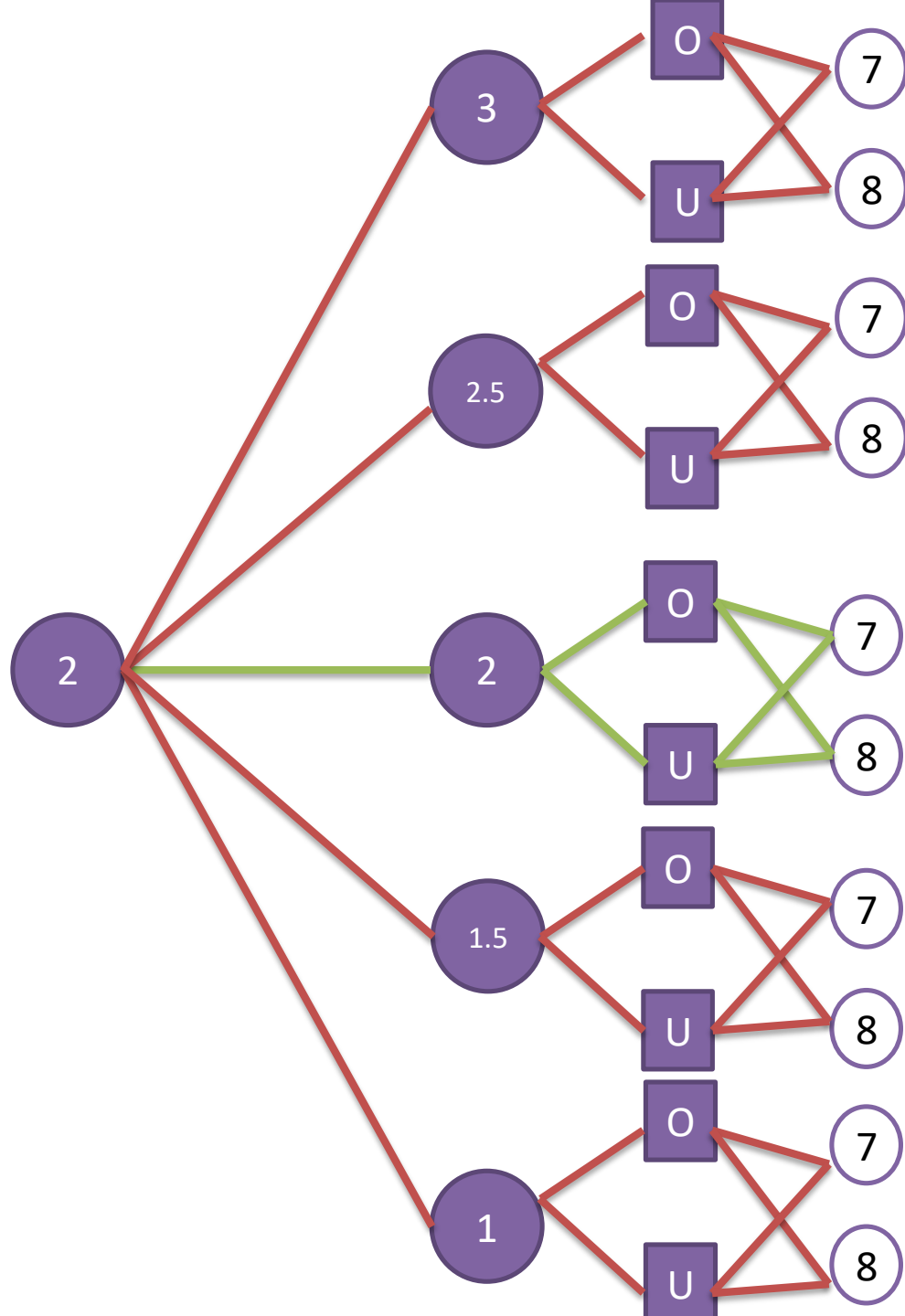
Looking for the Mirror Effect: A & B











A: Fewer External Circles

- 16 pairs (signal)
- 16 pairs (noise)
- 32 trials

B: More external circles

- 16 pairs (signal)
- 16 pairs (noise)
- 32 trials

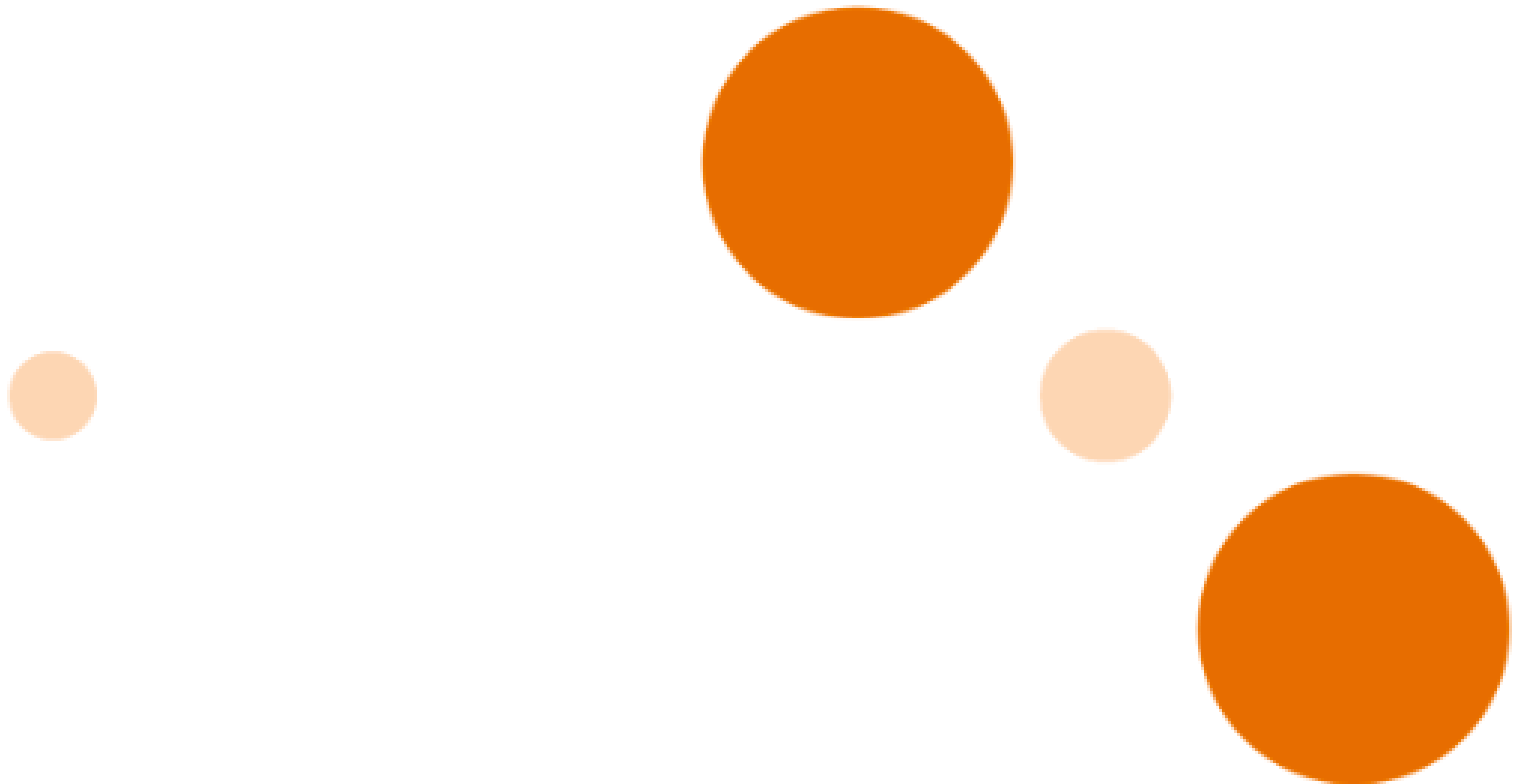
64 trials

- x10
 - 5 different colors
 - 2 per color
 - Counterbalancing

- 320 type A trials

- 320 type B trials

¿Los círculos centrales son del mismo tamaño?



S = Si

N = No

¿Los círculos centrales son del mismo tamaño?



S = Si



N = No

¿Los círculos centrales son del mismo tamaño?

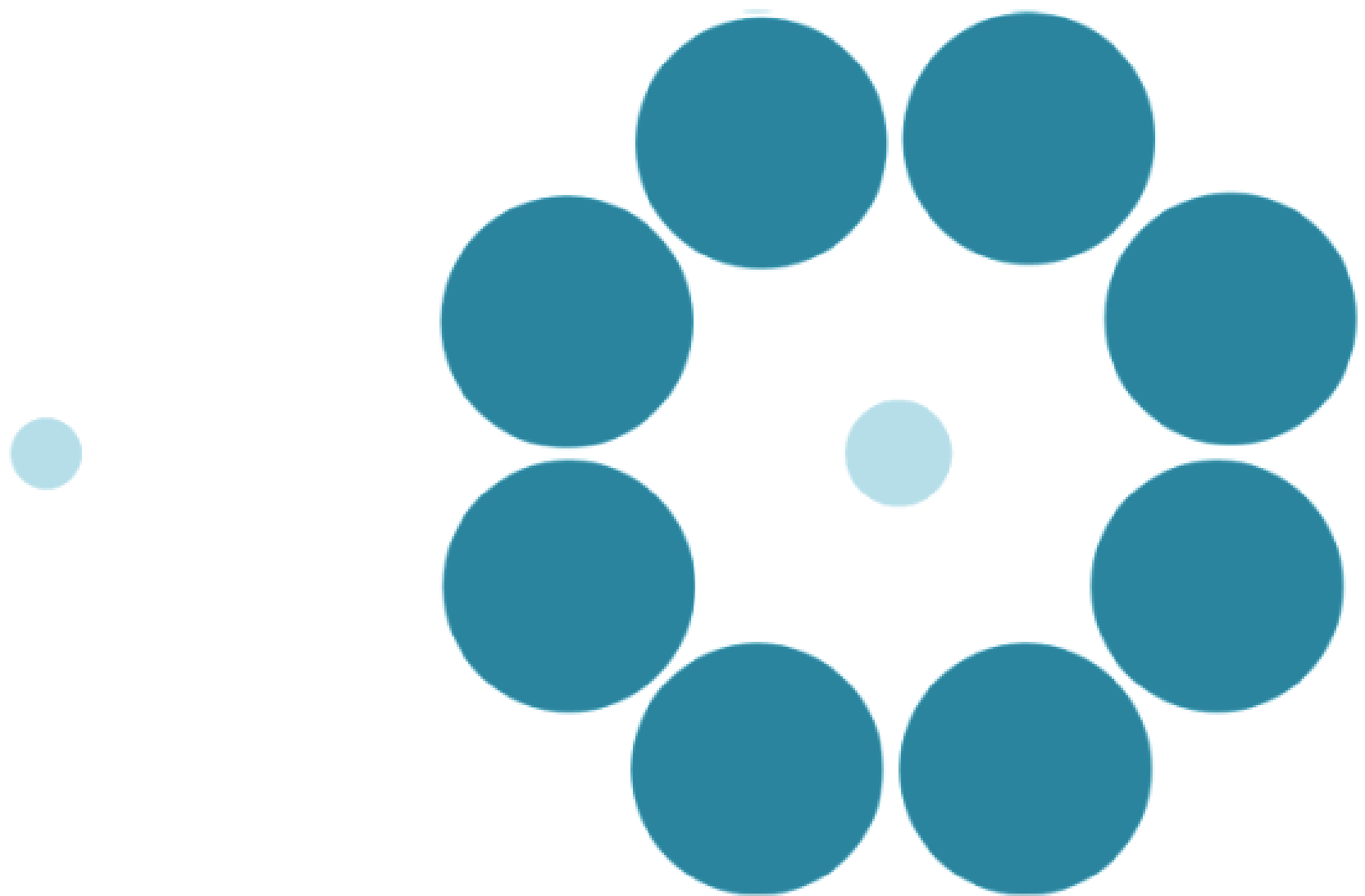


S = Si



N = No

¿Los círculos centrales son del mismo tamaño?



S = Si

N = No

Two Experiments

Experiment 1: Just one Ebbinghaus Illusion

- 160 AS
- 160 AN
- 160 BS
- 160 BN

- Same procedure

Experiment 2: Two Ebbinghaus Illusions

- 160 AS
- 160 AN
- 160 BS
- 160 BN

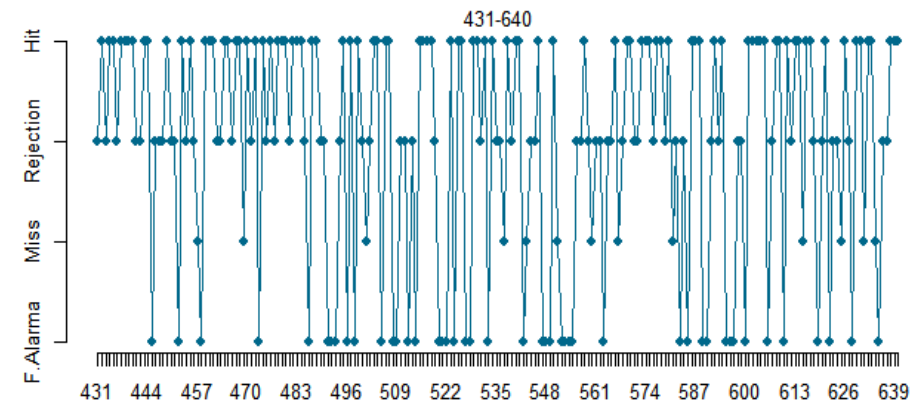
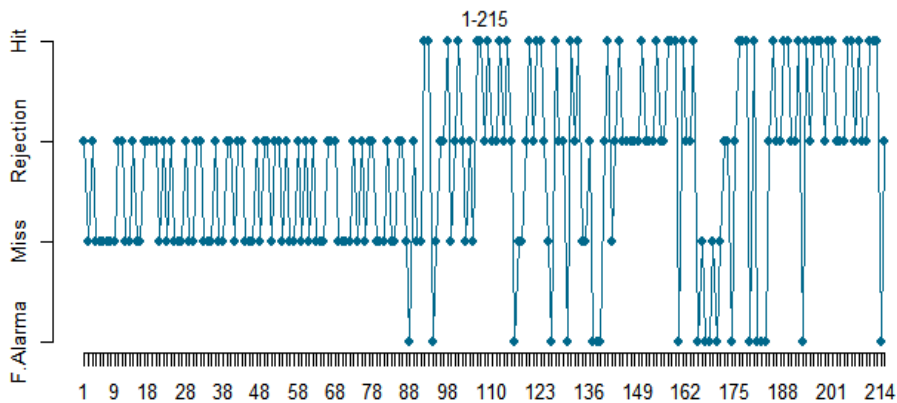
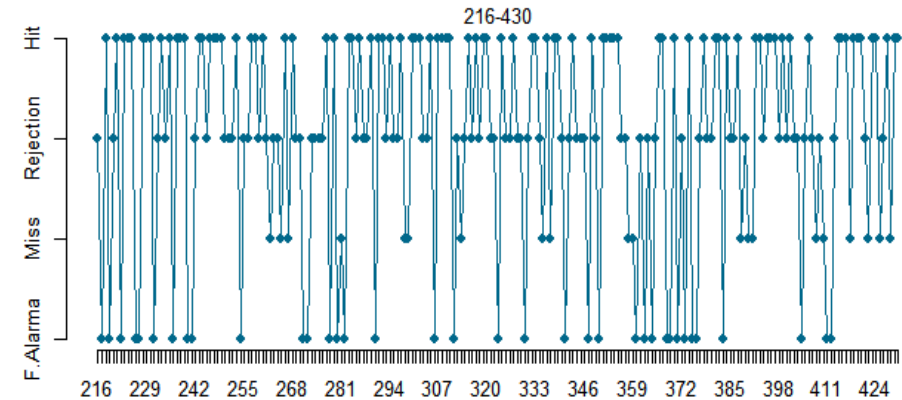
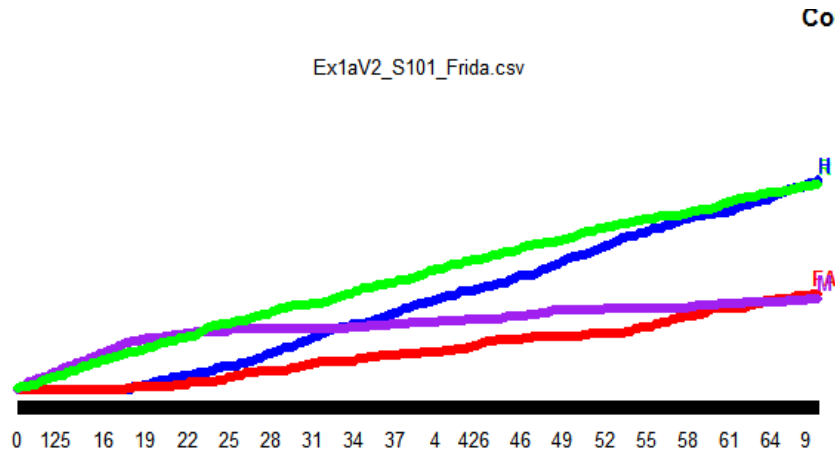
- Same procedure

Data!

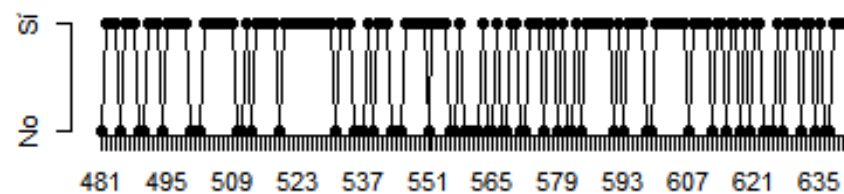
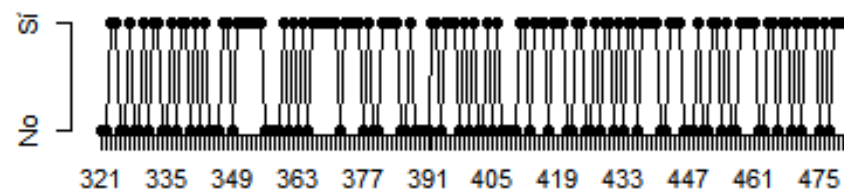
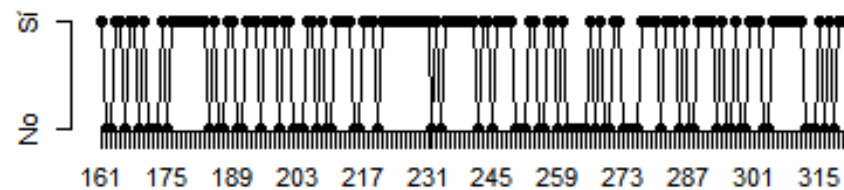
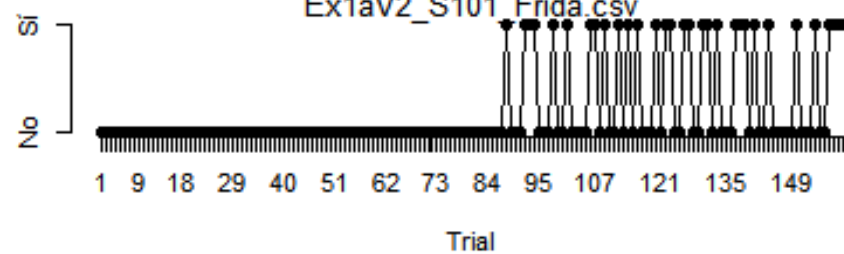
Individual cases

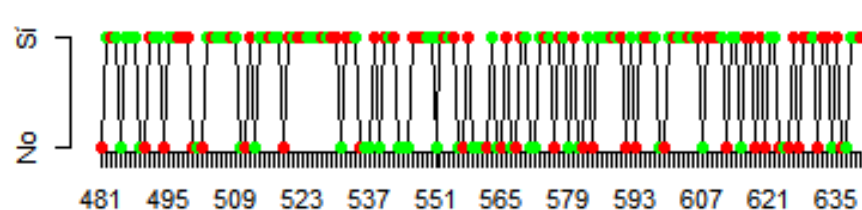
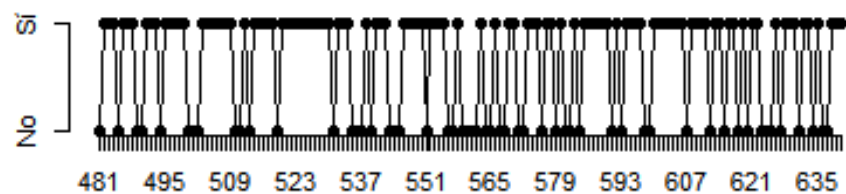
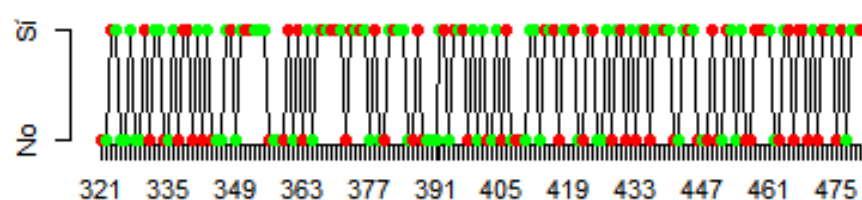
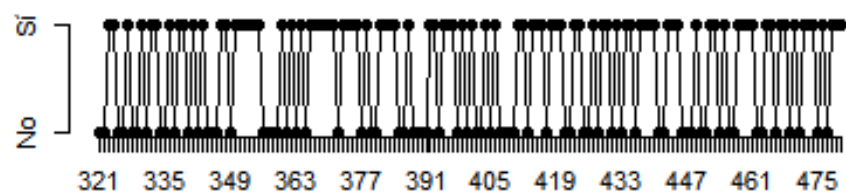
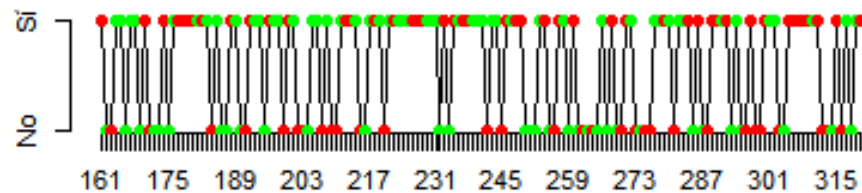
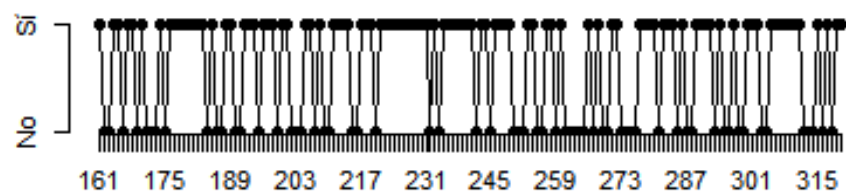
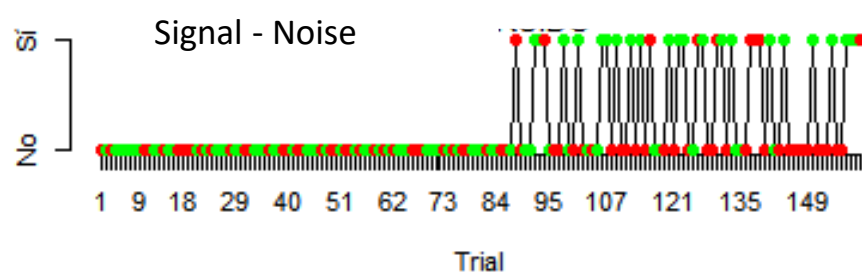
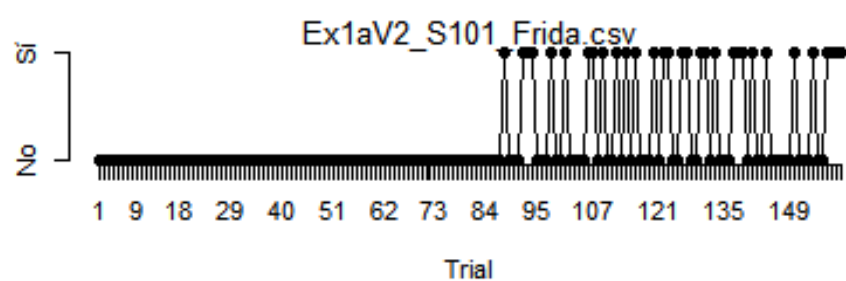
1st: Looking for Contaminants

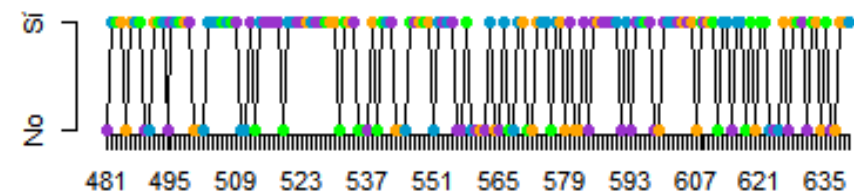
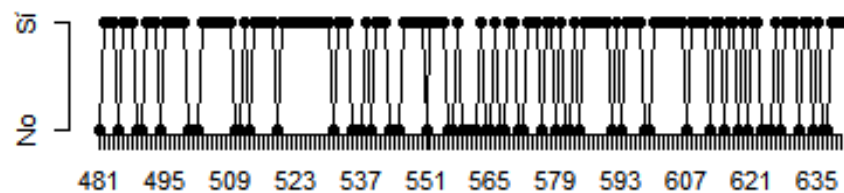
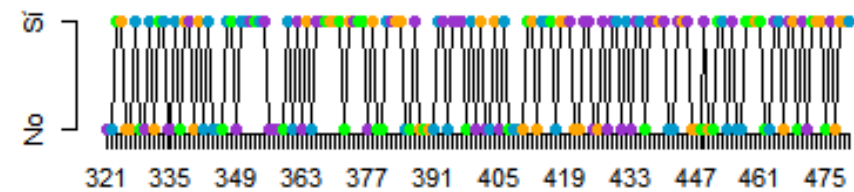
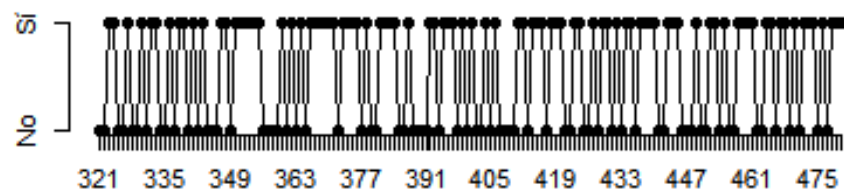
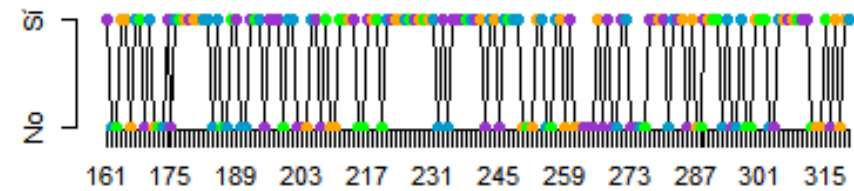
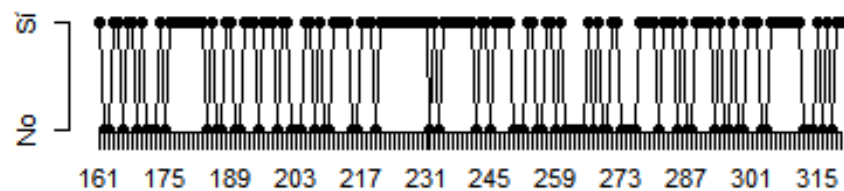
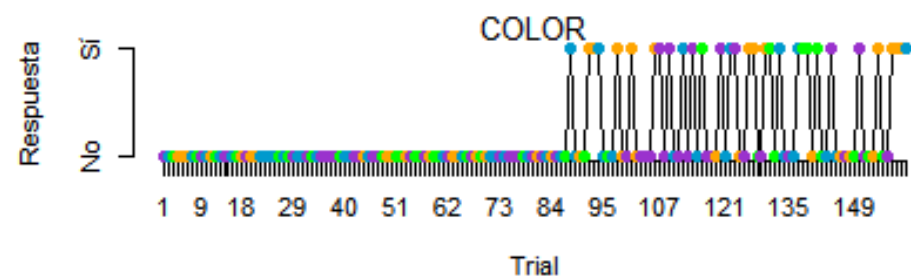
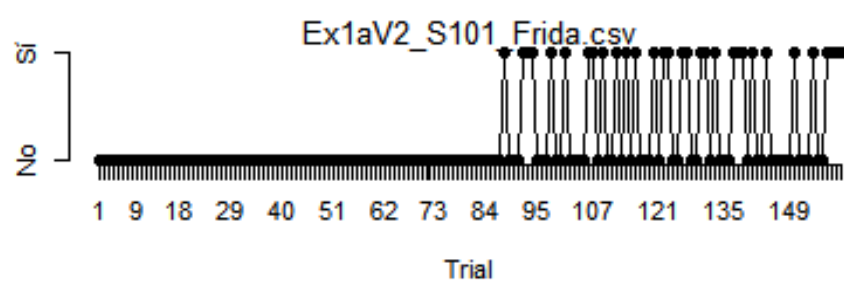
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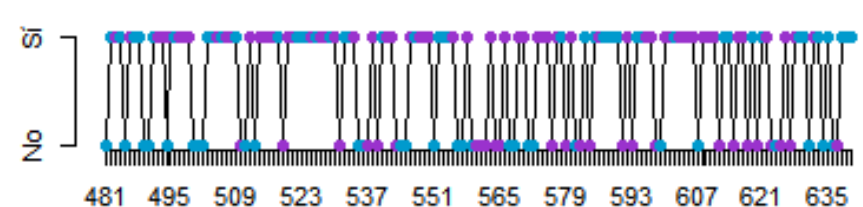
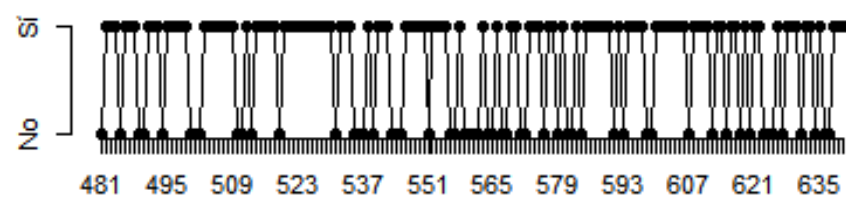
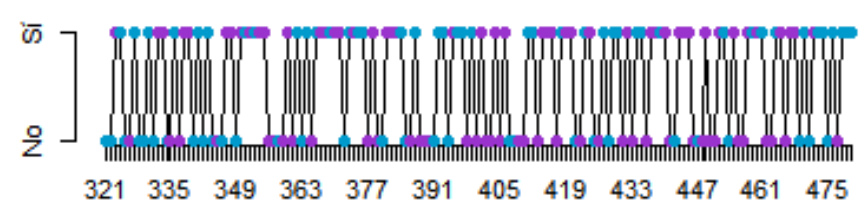
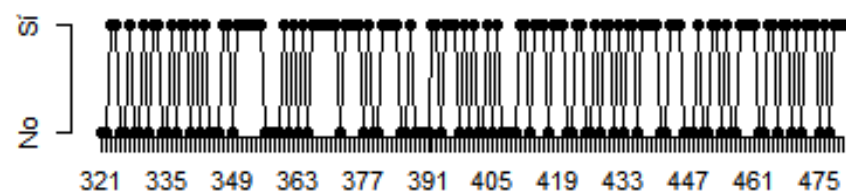
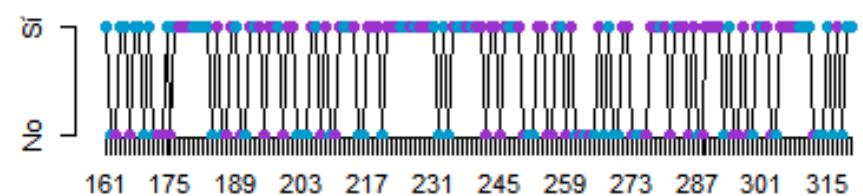
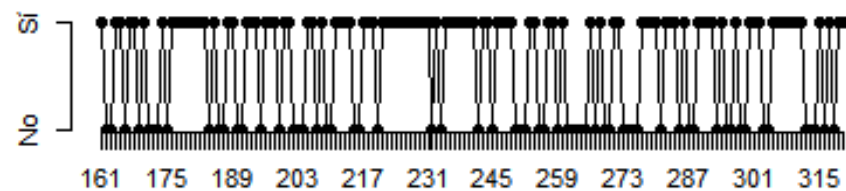
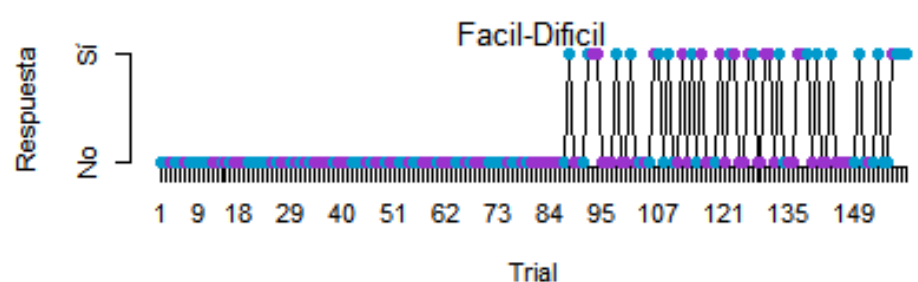
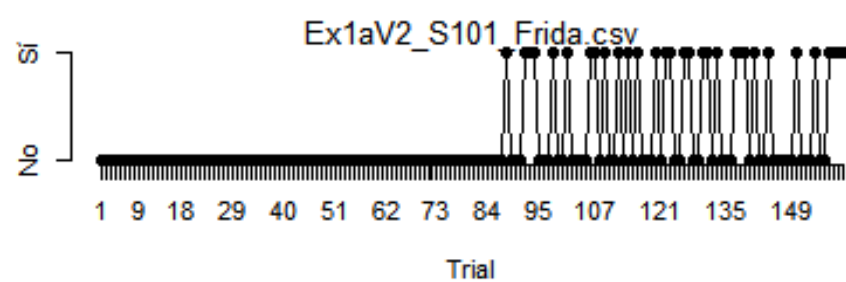


Ex1aV2_S101_Frida.csv





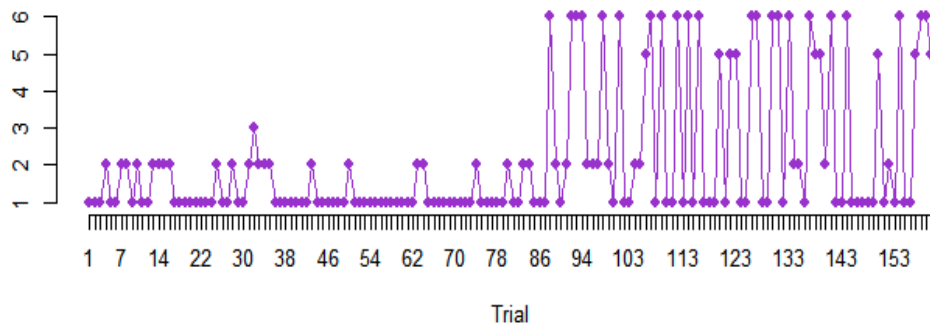




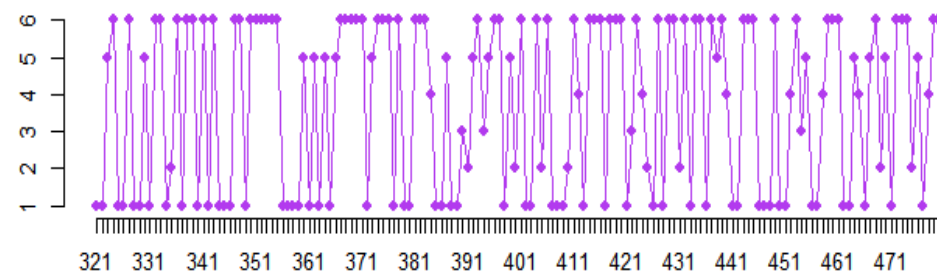
ConfidenceRate per Trial

Ex1aV2_S101_Frida.csv

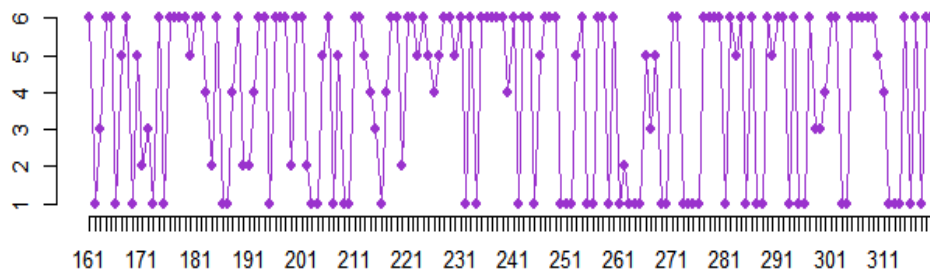
1-160



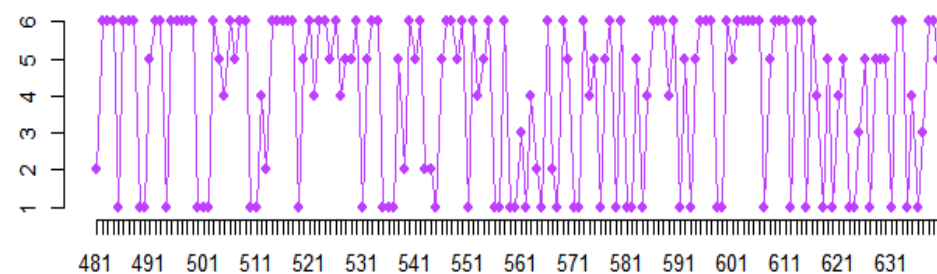
321-480



161-320



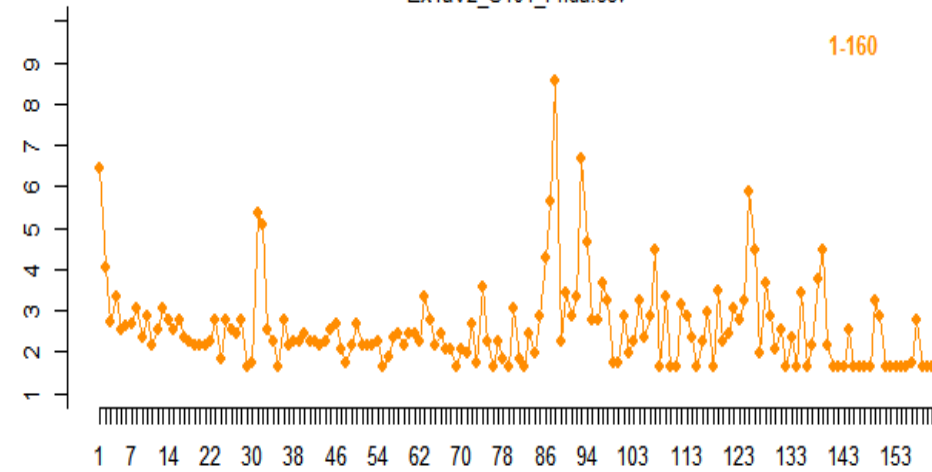
481-640



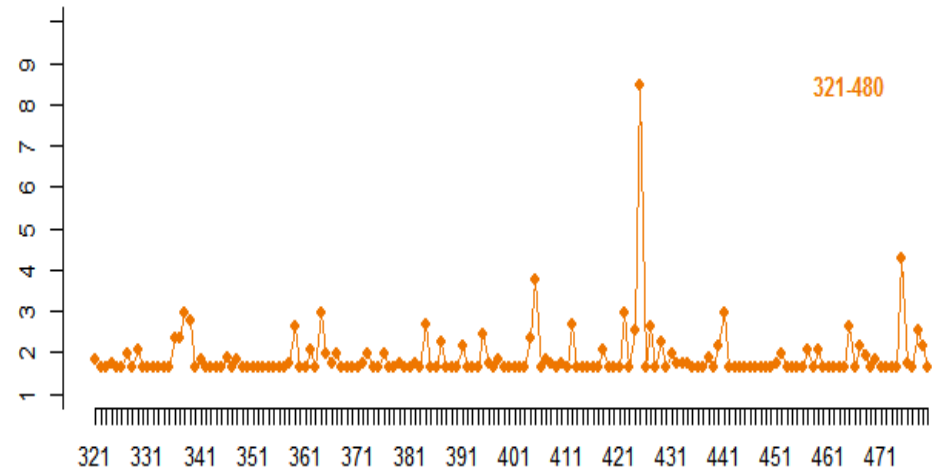
Tiempo de Respuesta al Estimulo

Ex1aV2_S101_Frida.csv

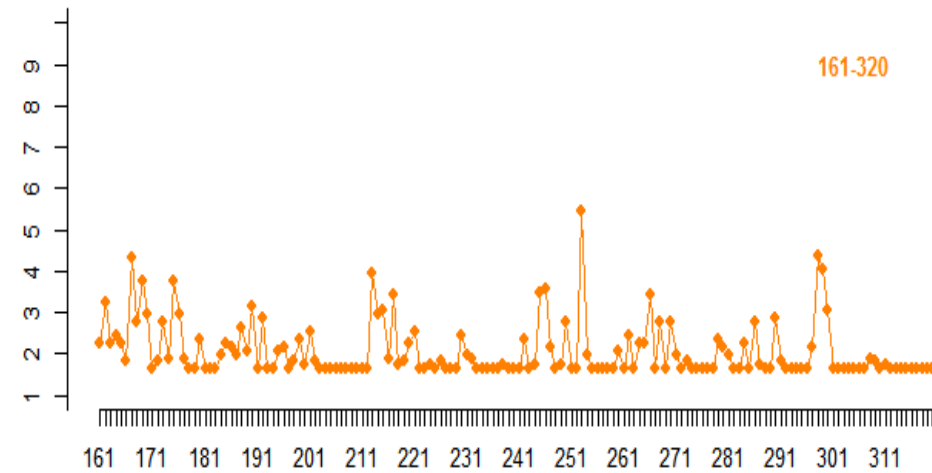
1-160



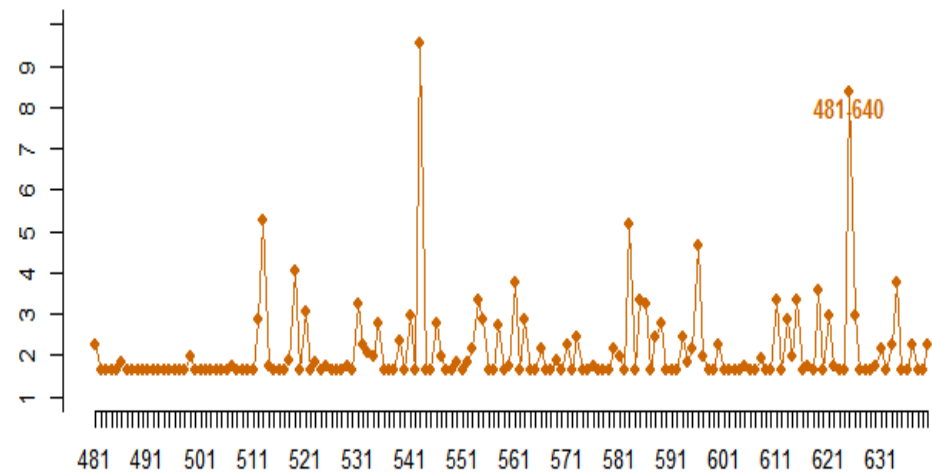
321-480



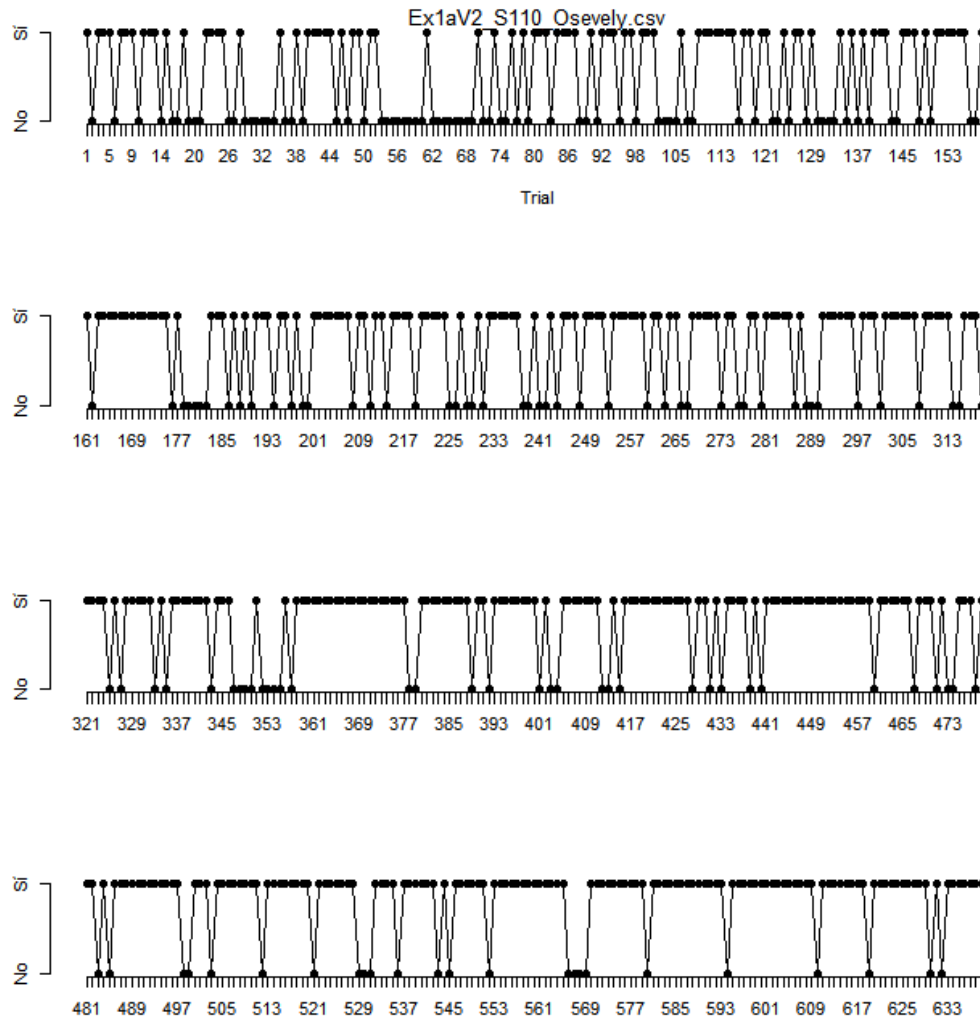
161-320

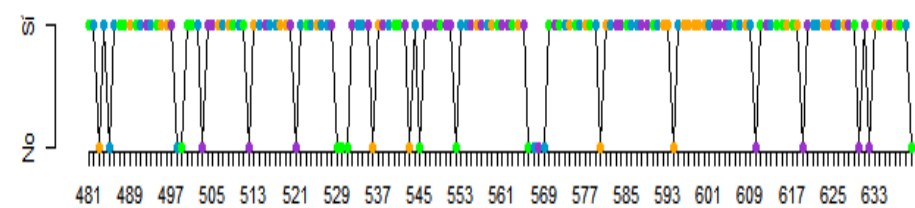
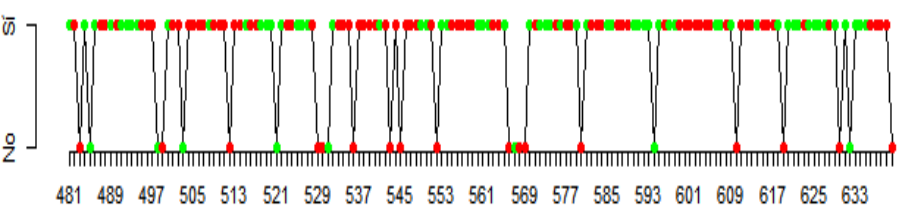
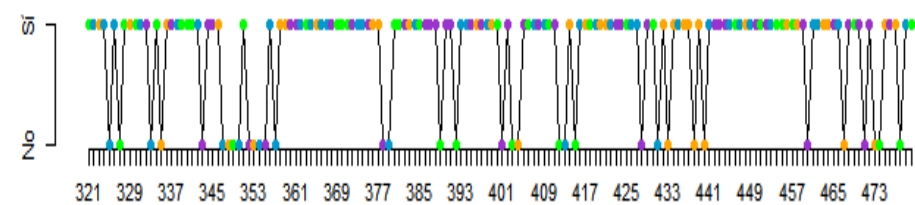
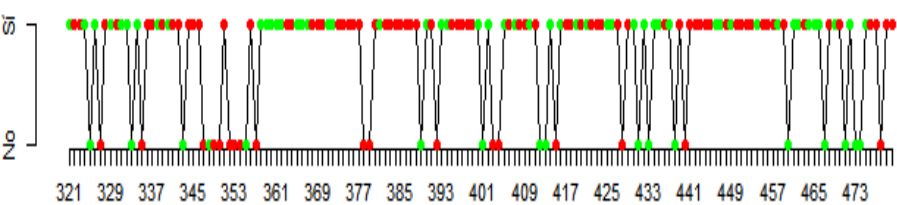
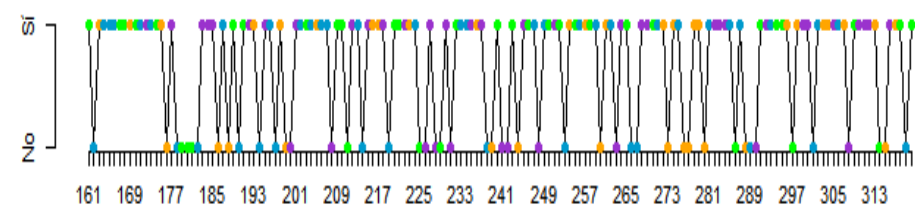
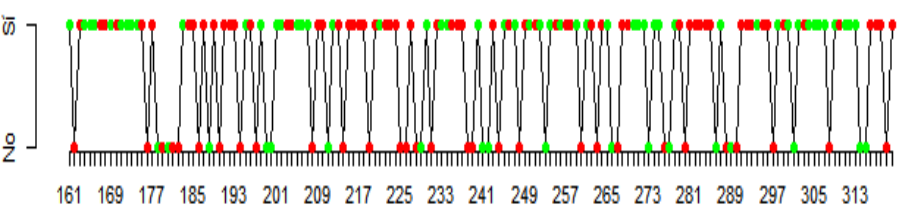
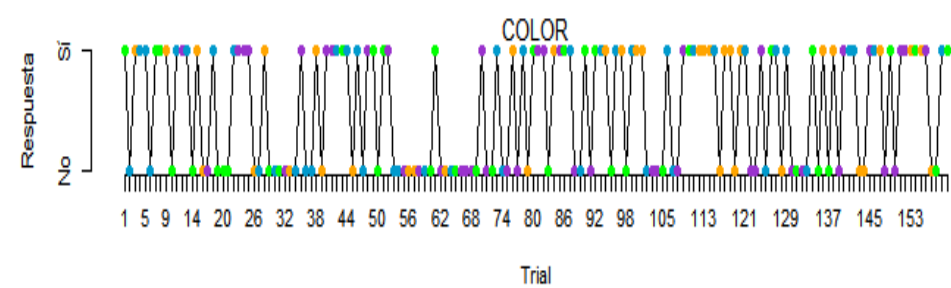
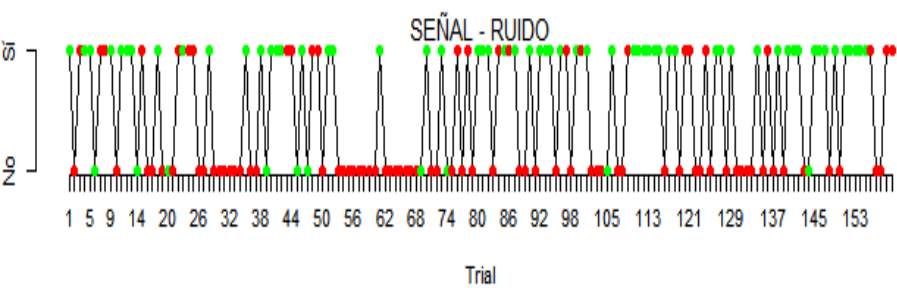


481-640

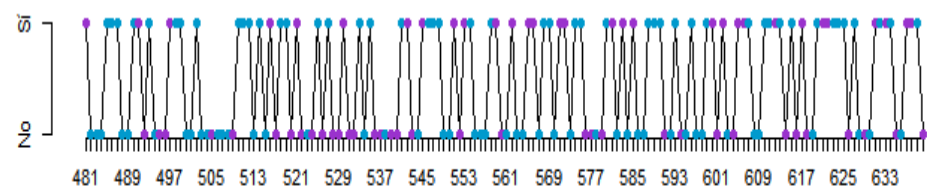
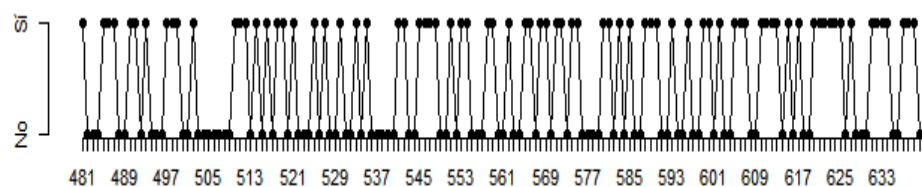
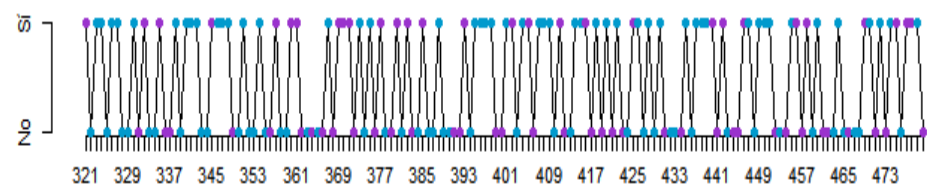
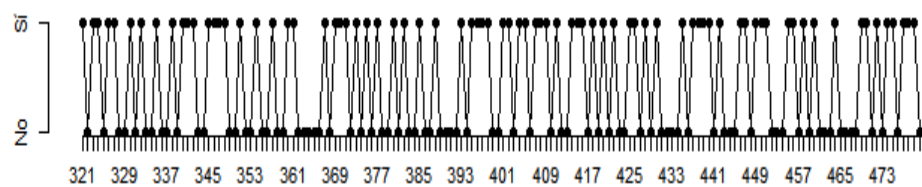
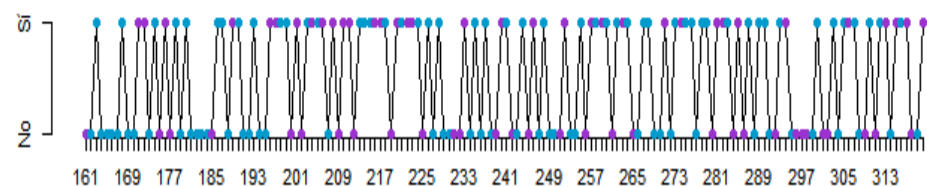
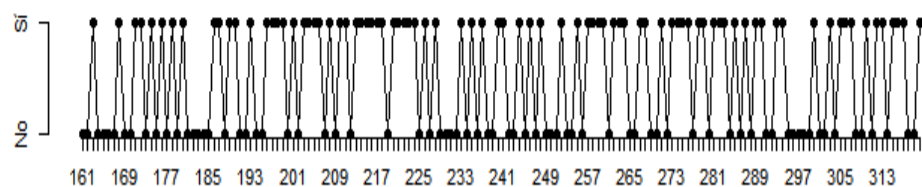
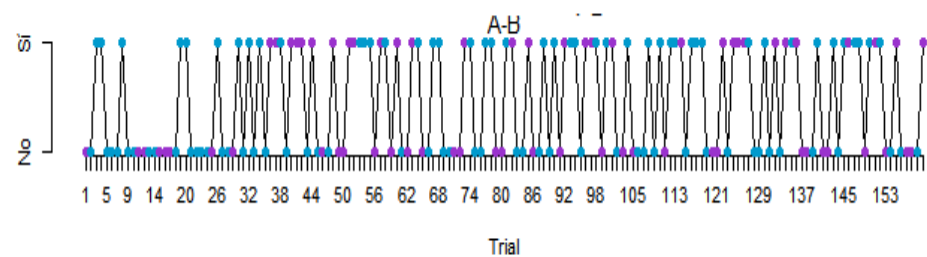
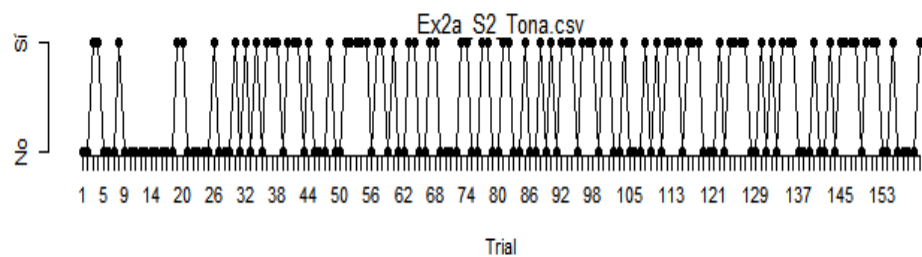


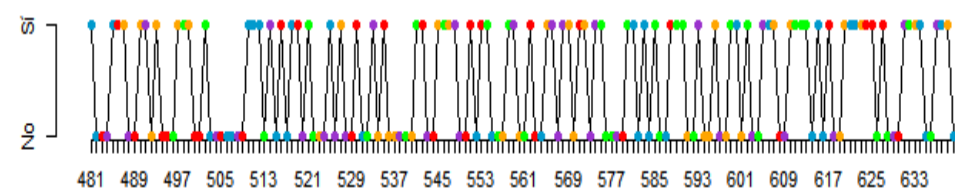
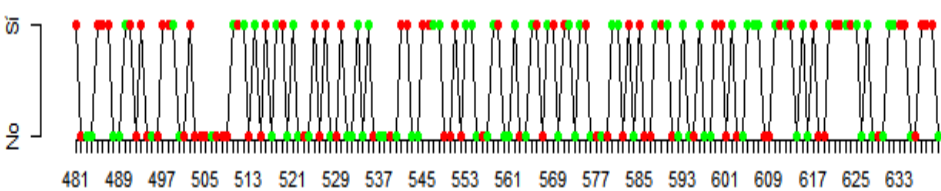
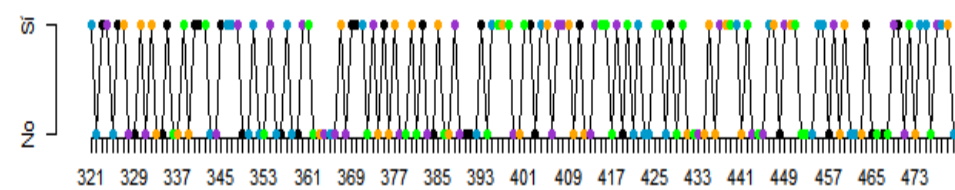
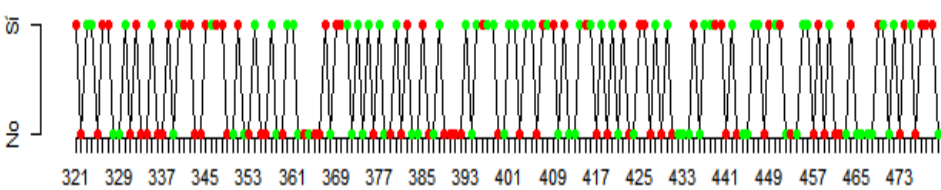
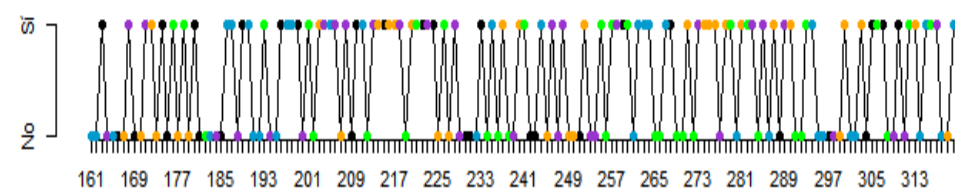
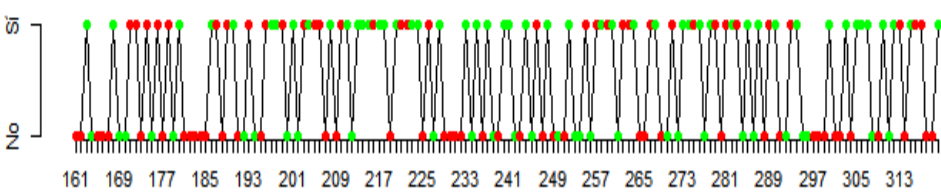
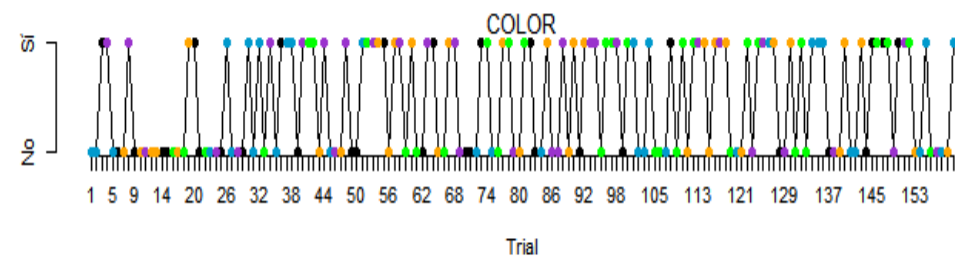
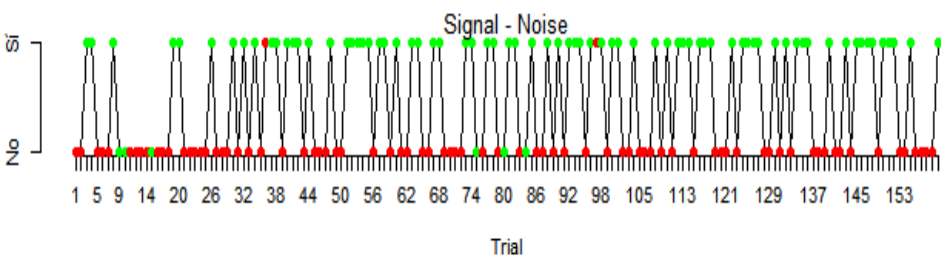
1st Problem: How do I know if a participant was actually paying attention?





Choice per trial

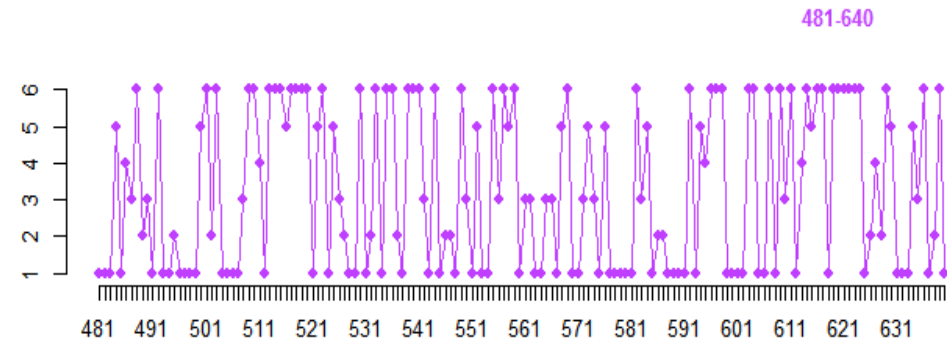
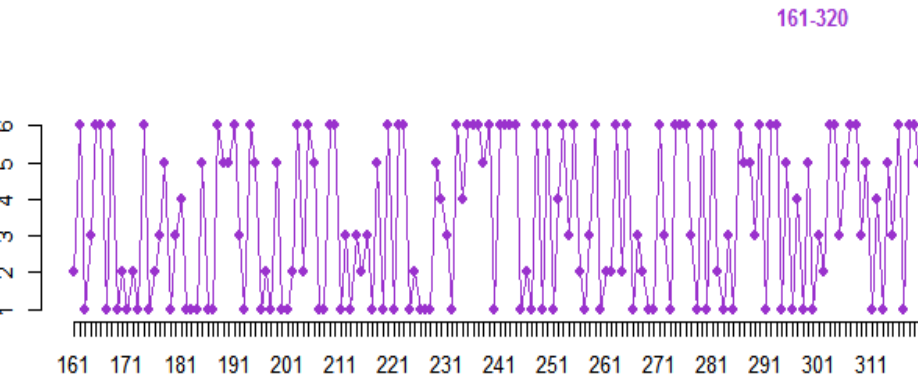
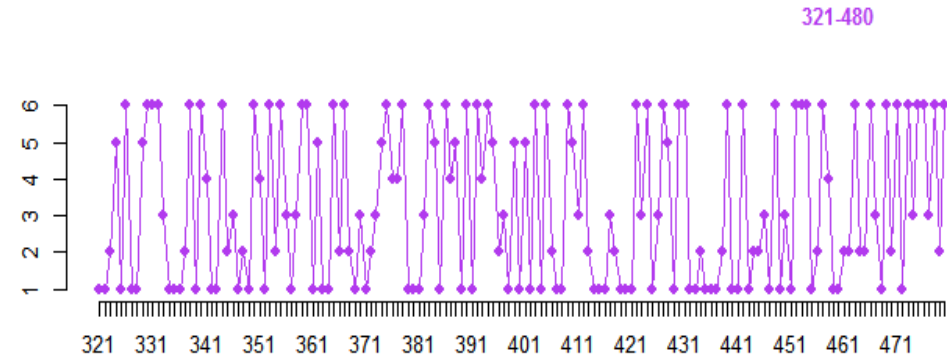
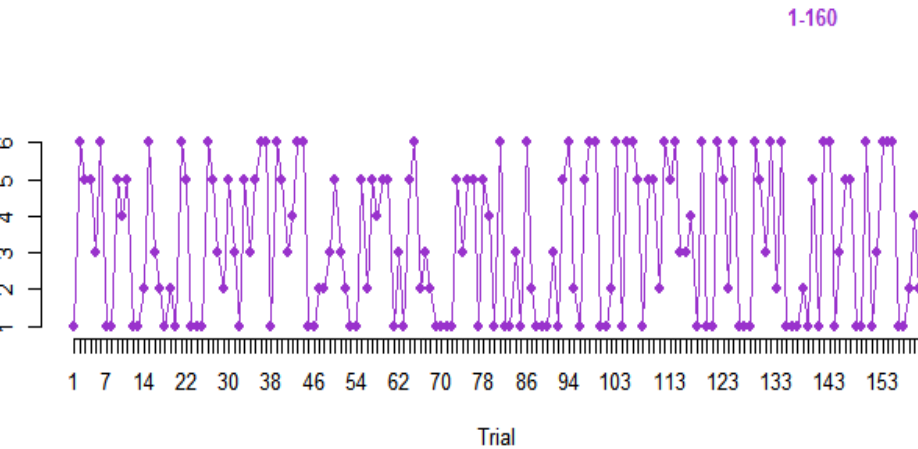




Confidence Rating

ConfidenceRate per Trial

Ex2a_S10_Jor.csv



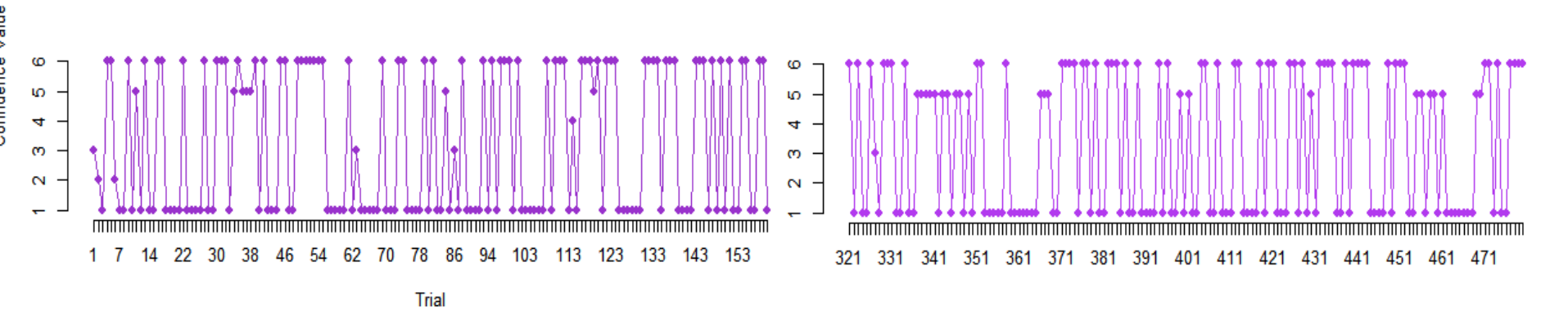
Confidence Rating

ConfidenceRate per Trial

Ex2a_S7_PaoVi.csv

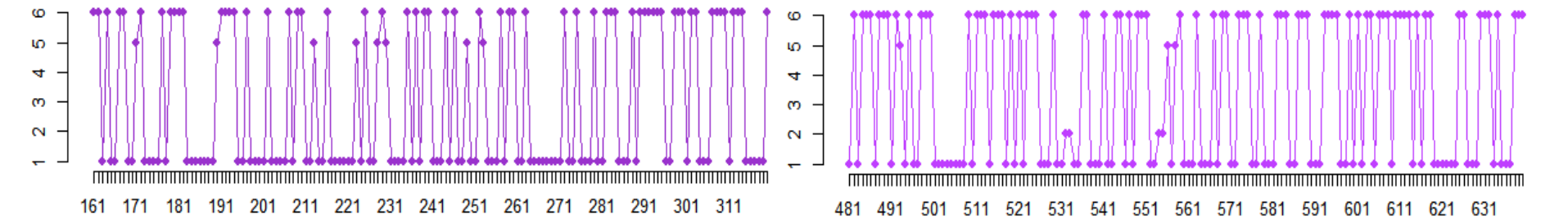
1-160

321-480



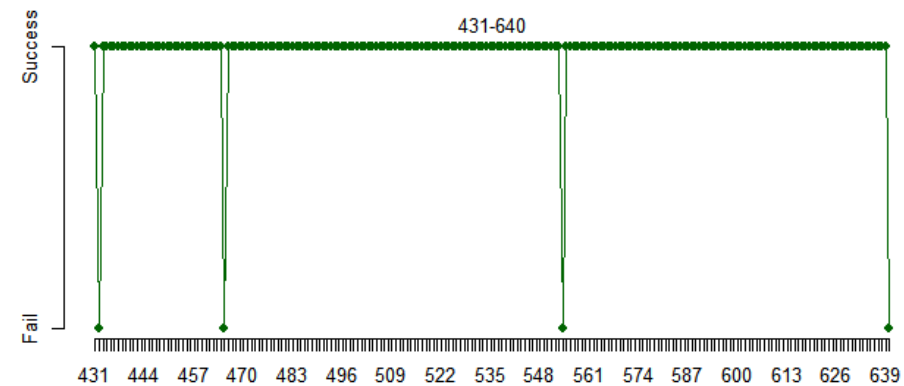
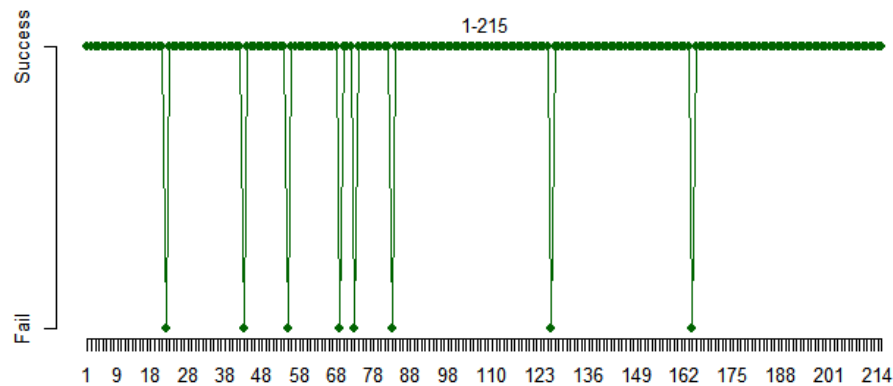
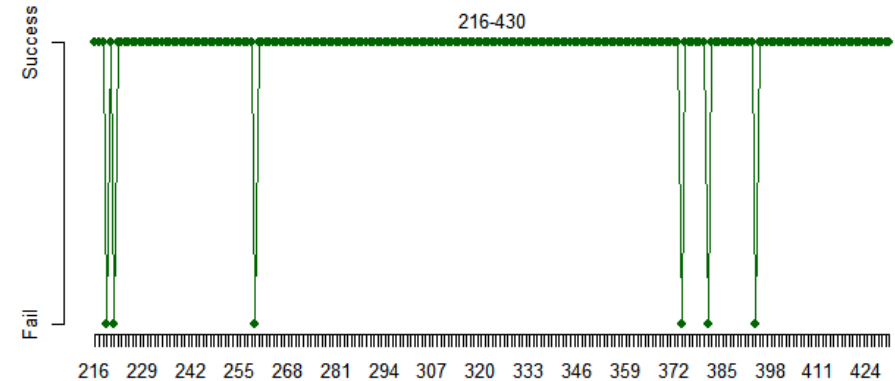
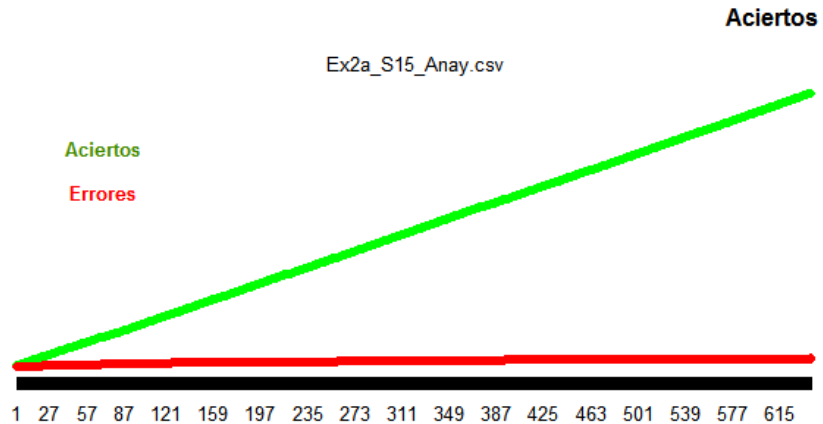
161-320

481-640



2nd: Exploring Sequential effects

2nd: Exploring Sequential effects

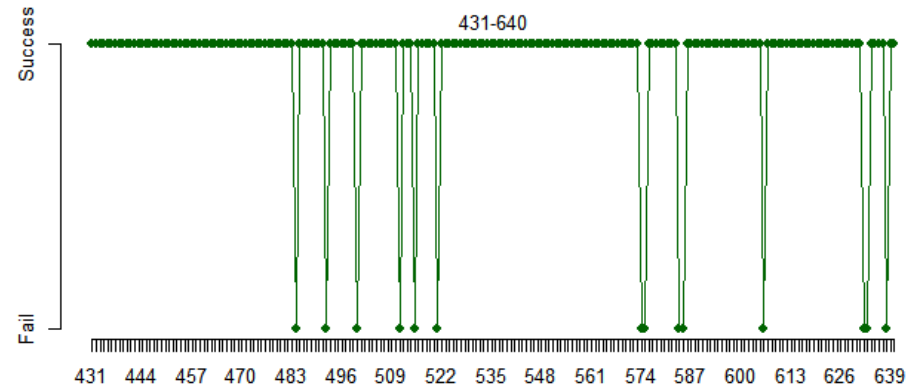
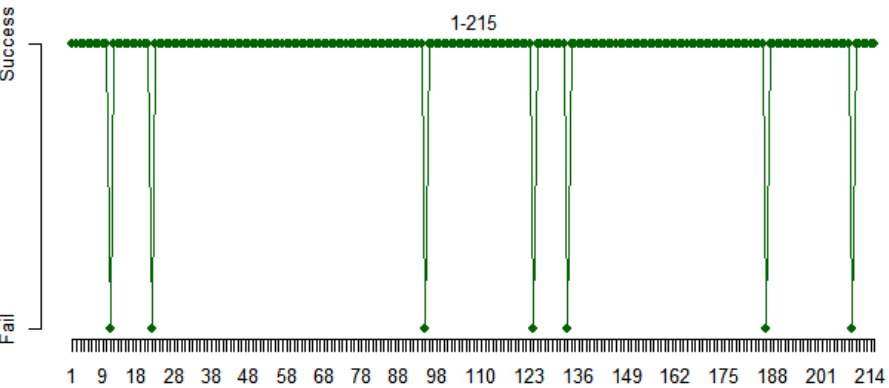
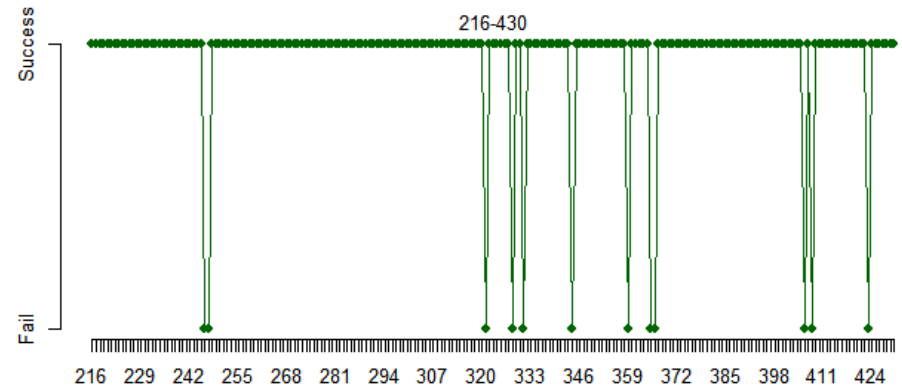
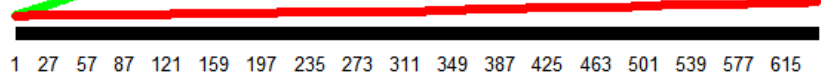


Aciertos y errores por ensayo

Ex2a_S12_Ere.csv

Aciertos

Errores



Aciertos y errores por ensayo

Ex2a_S5_DanFer.csv

Aciertos

Errores

1 27 57 87 121 159 197 235 273 311 349 387 425 463 501 539 577 615

Success

Fail

216-430

216 229 242 255 268 281 294 307 320 333 346 359 372 385 398 411 424

Success

Fail

1-215

1 9 18 28 38 48 58 68 78 88 98 110 123 136 149 162 175 188 201 214

Success

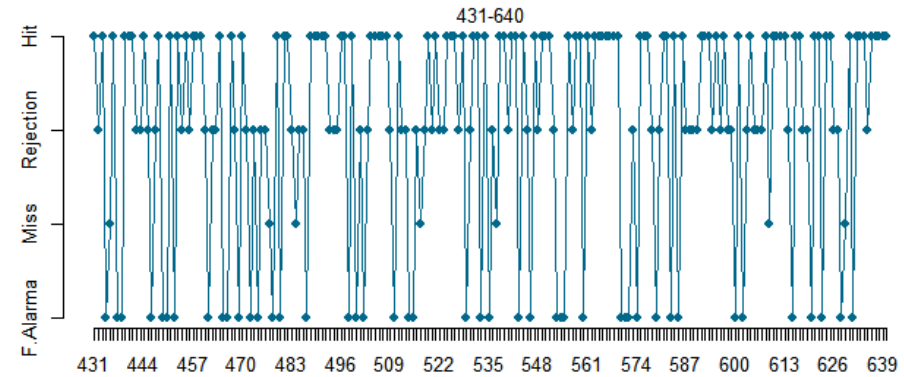
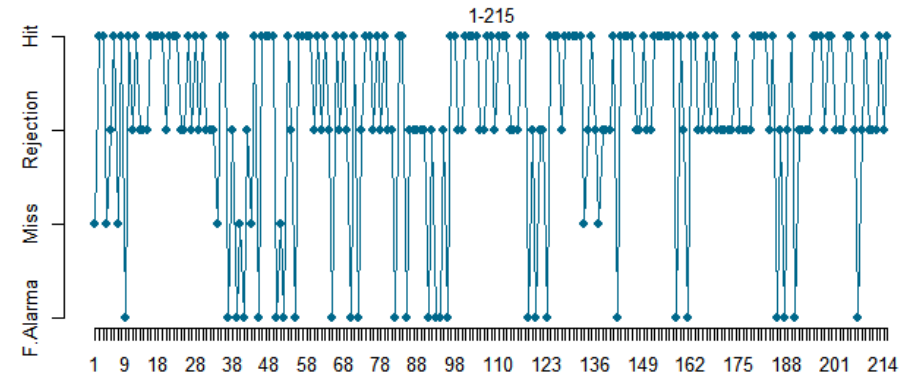
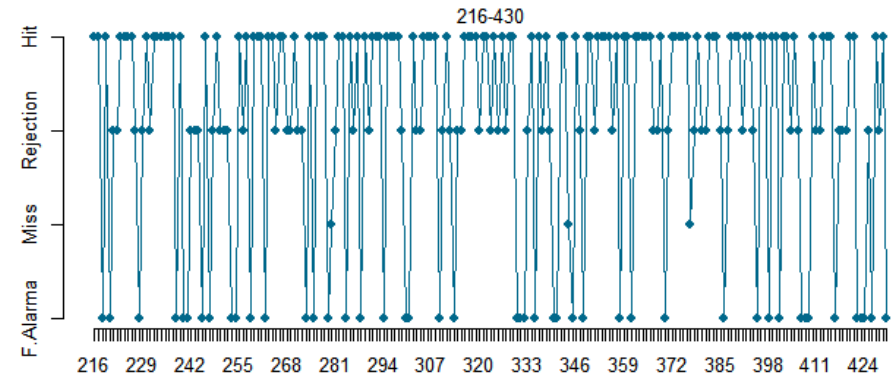
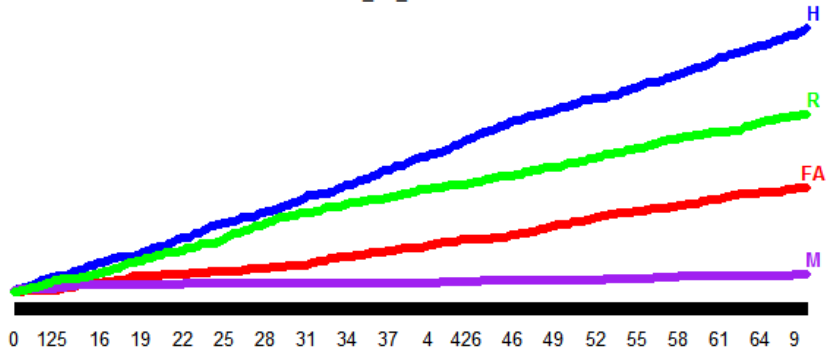
Fail

431-640

431 444 457 470 483 496 509 522 535 548 561 574 587 600 613 626 639

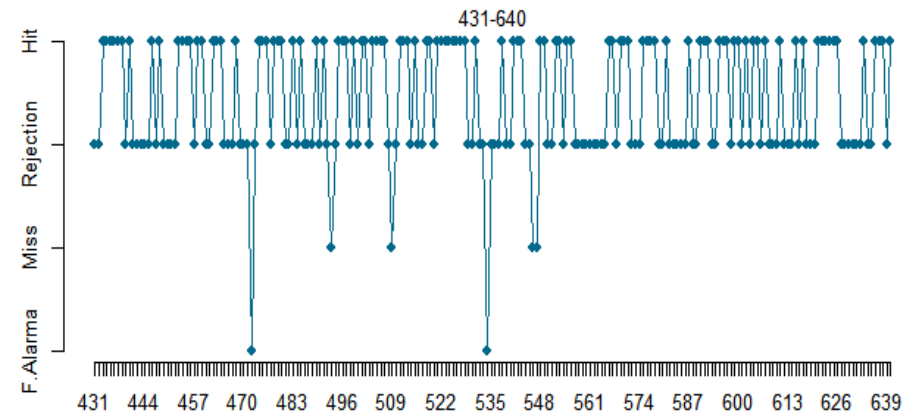
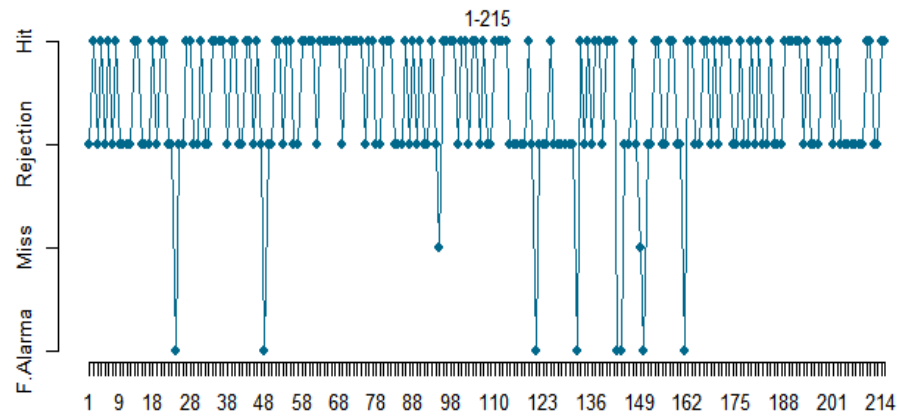
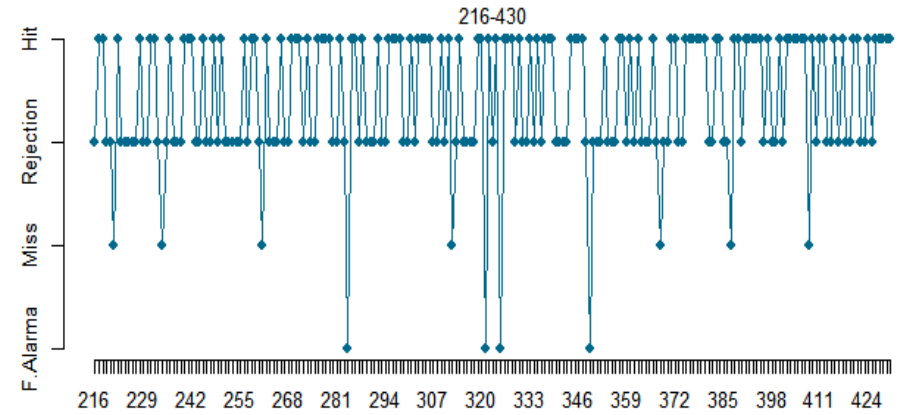
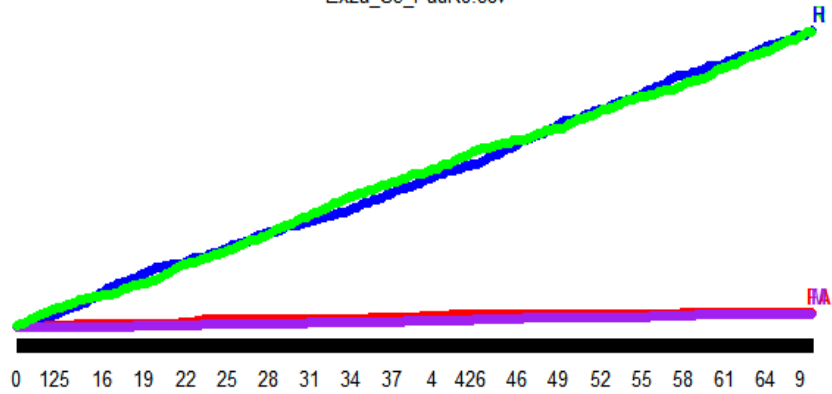
Contadores por ensayo

Ex2a_S5_DanFer.csv



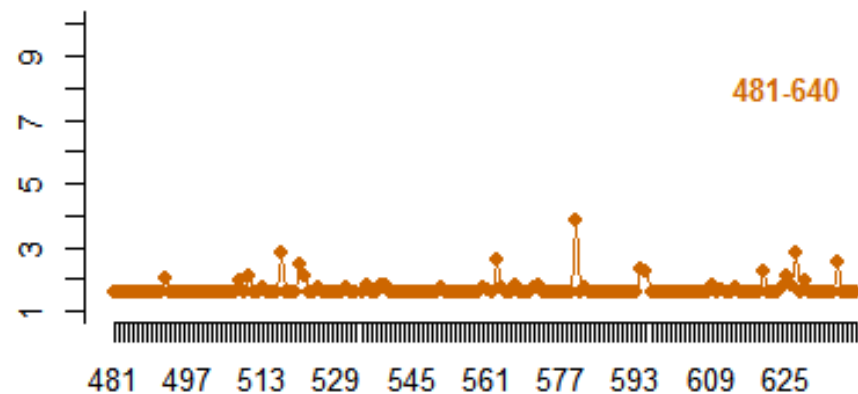
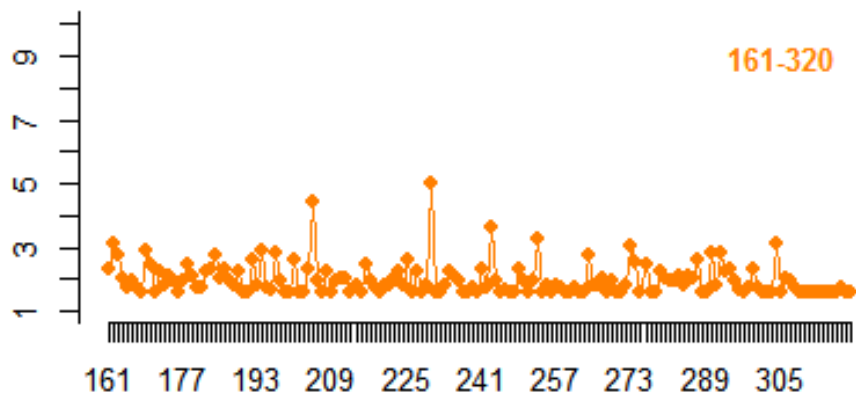
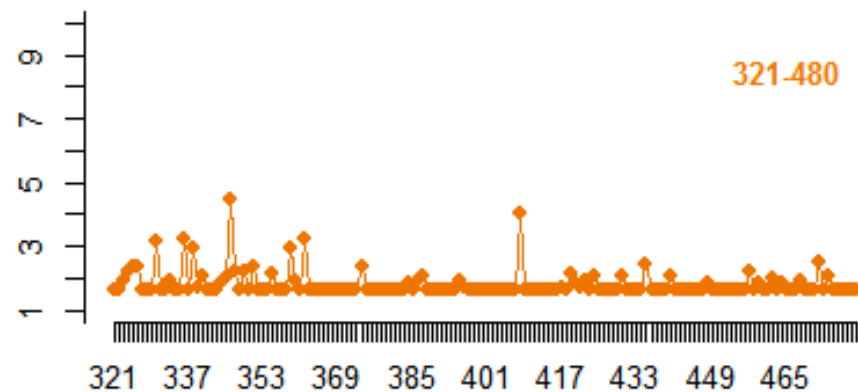
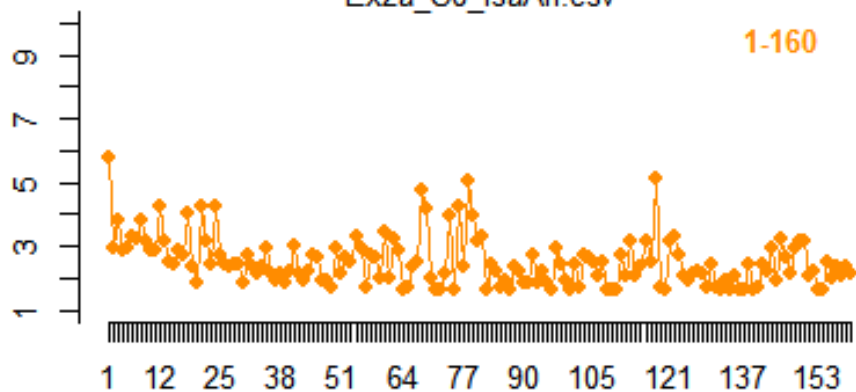
Contadores por ensayo

Ex2a_S3_PauRo.csv



Response Time to the Stimulus

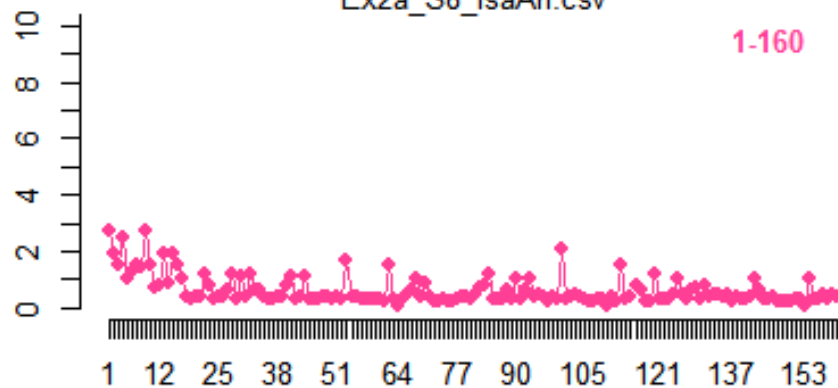
Ex2a_S8_IsaAn.csv



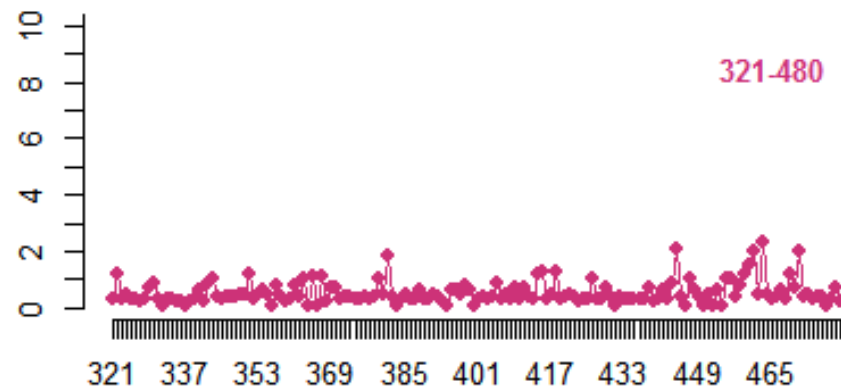
Response Time to the scale

Ex2a_S8_IsaAn.csv

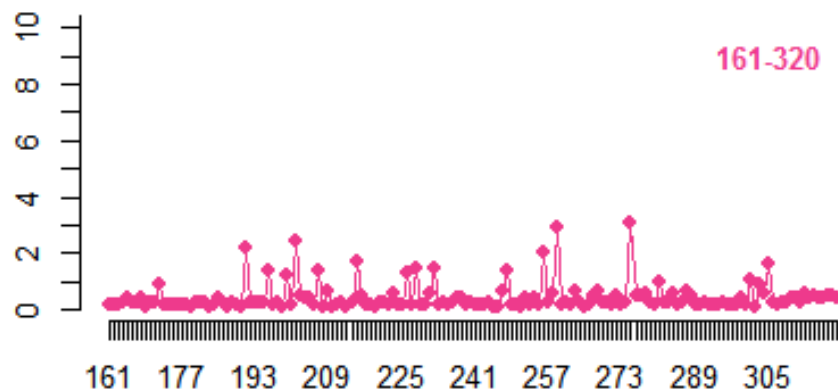
1-160



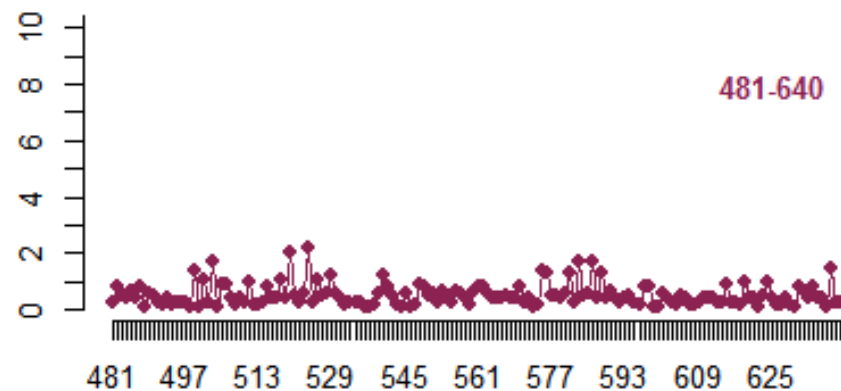
321-480



161-320



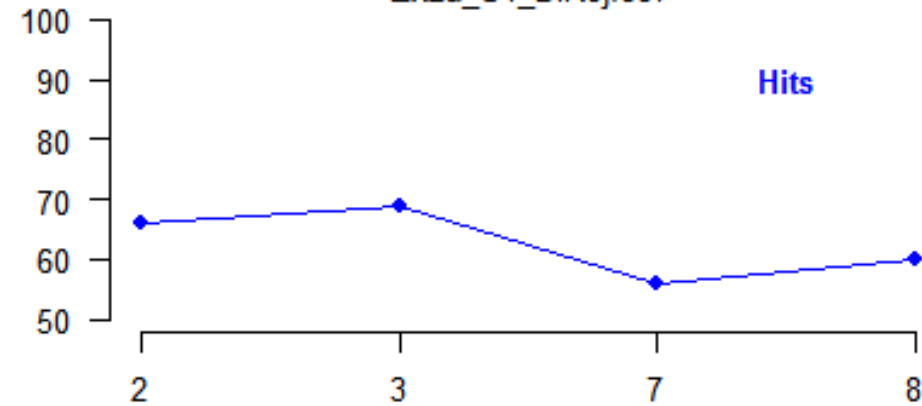
481-640



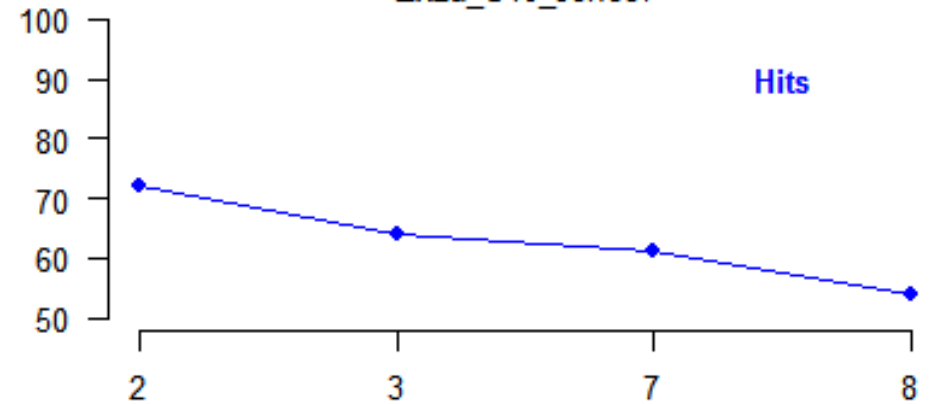
3rd: Exploring Correlations!

3rd: Exploring Correlations!

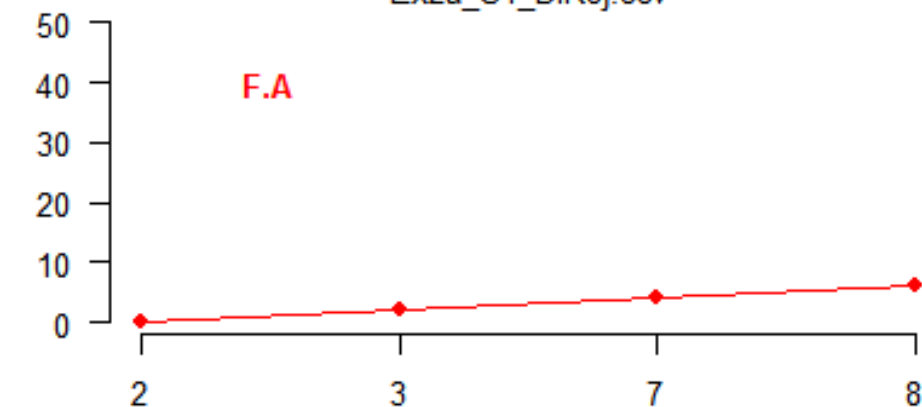
Ex2a_S4_DiRoj.csv



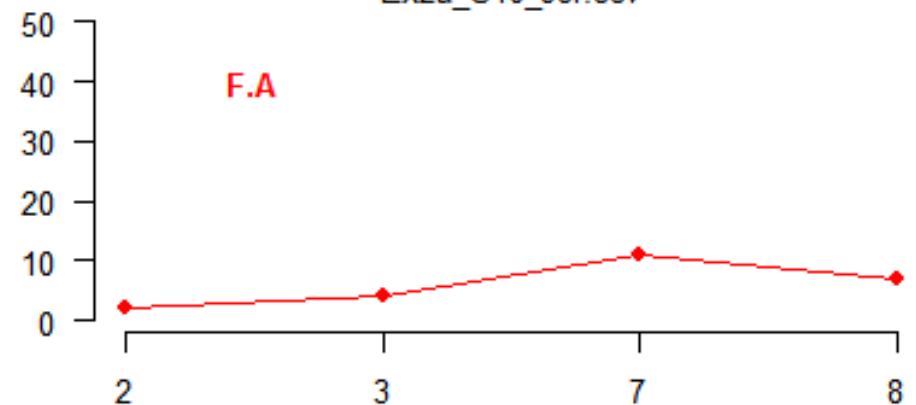
Ex2a_S10_Jor.csv

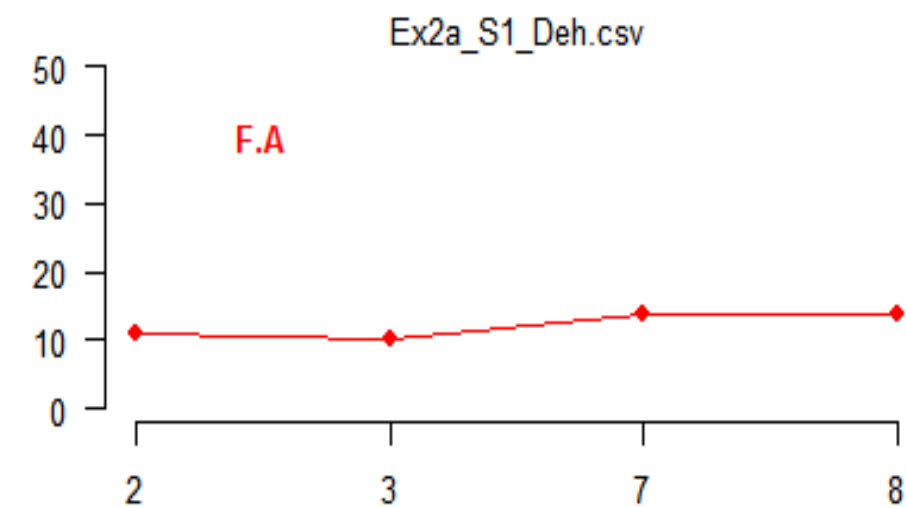
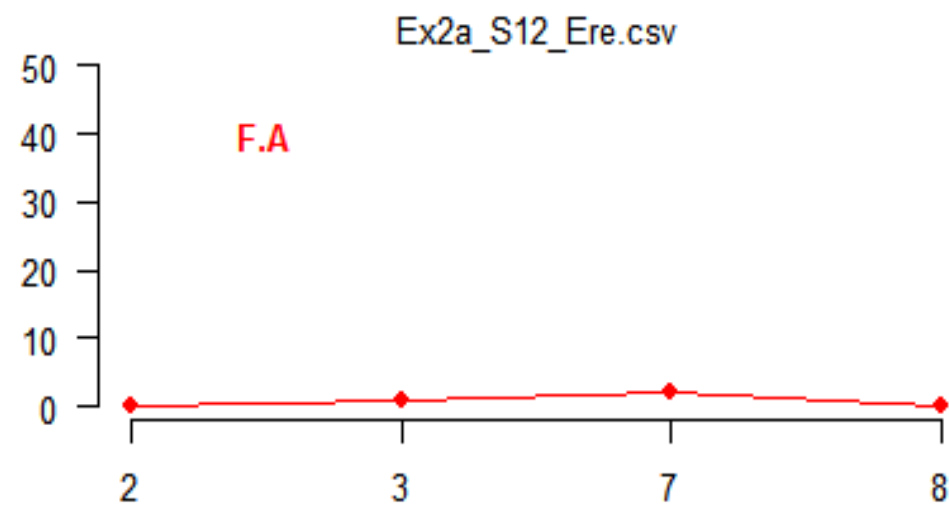
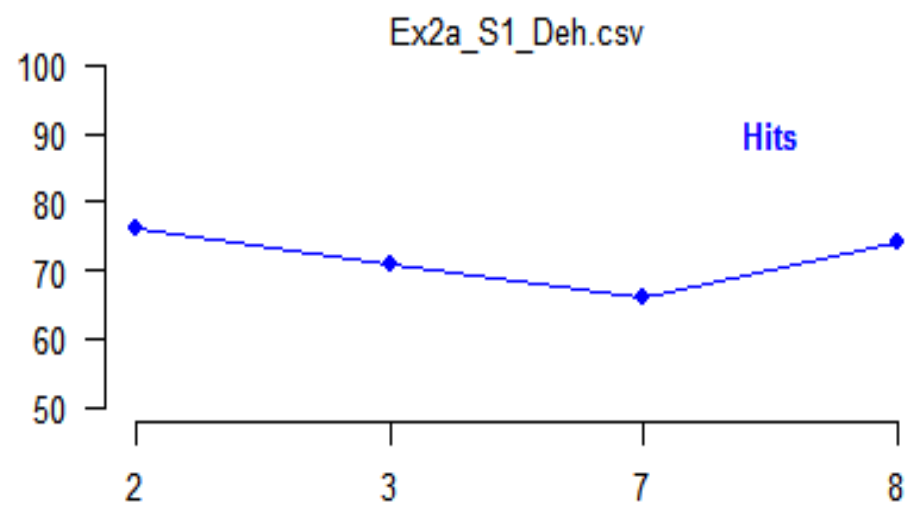
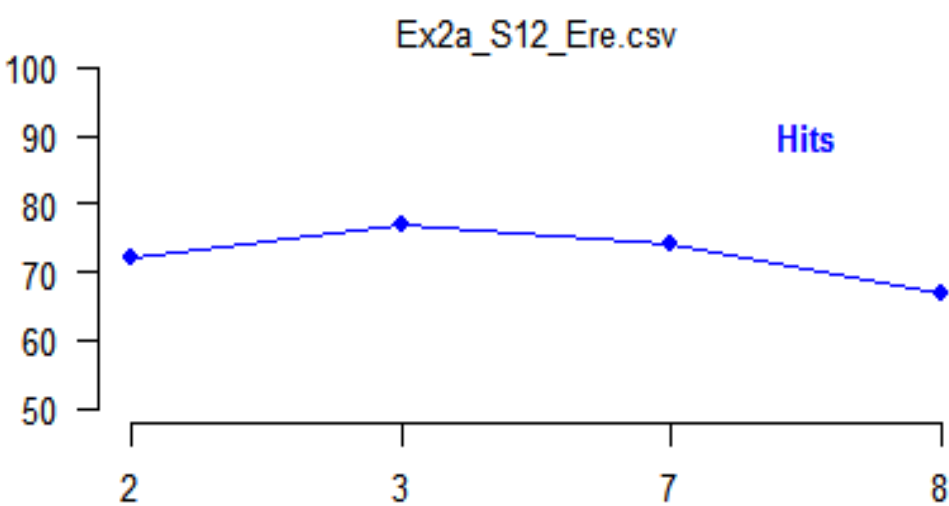


Ex2a_S4_DiRoj.csv

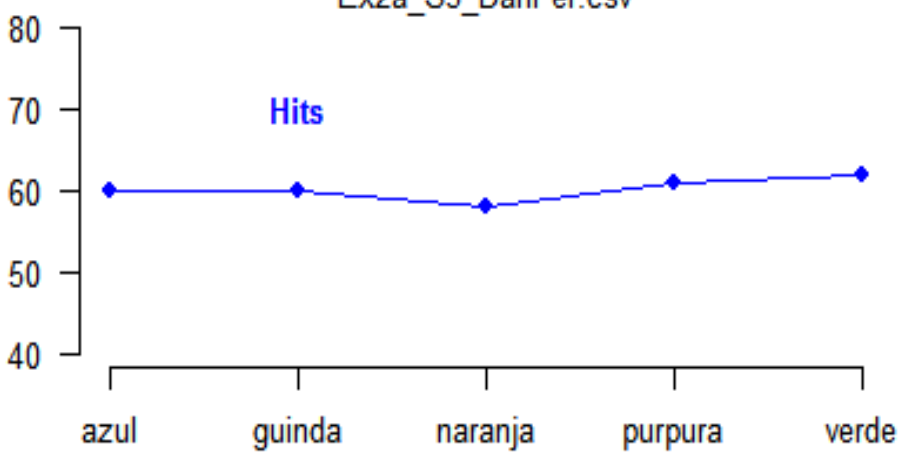


Ex2a_S10_Jor.csv

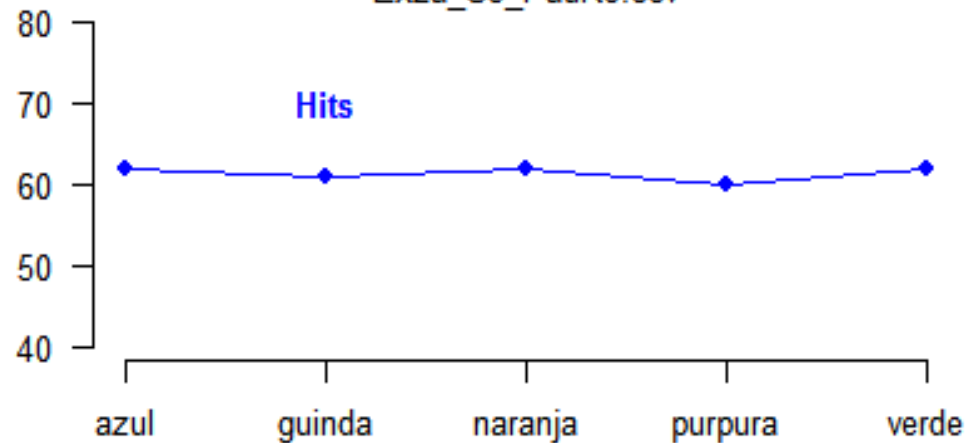




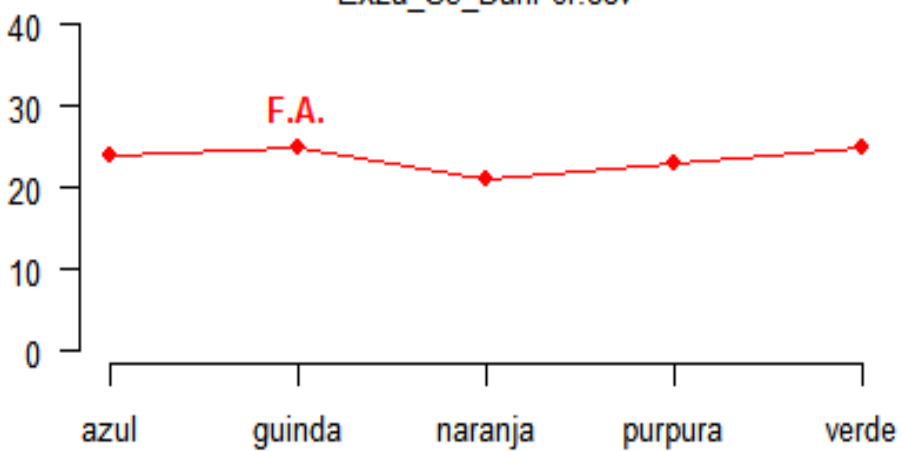
Ex2a_S5_DanFer.csv



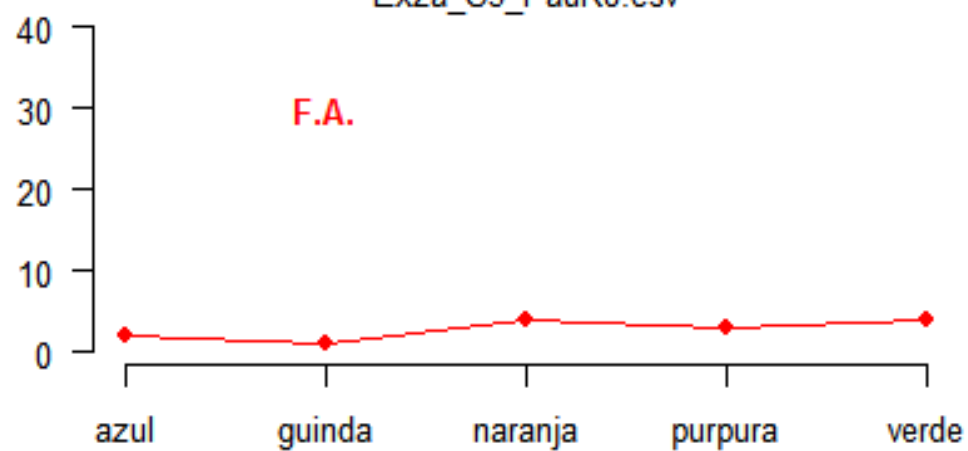
Ex2a_S3_PauRo.csv



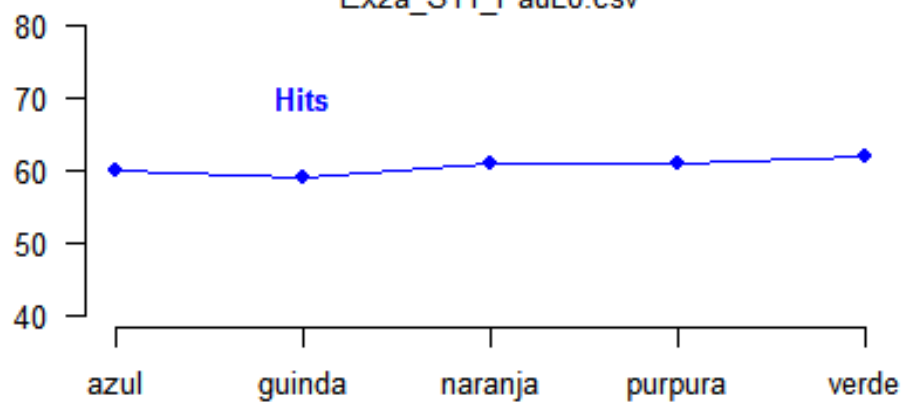
Ex2a_S5_DanFer.csv



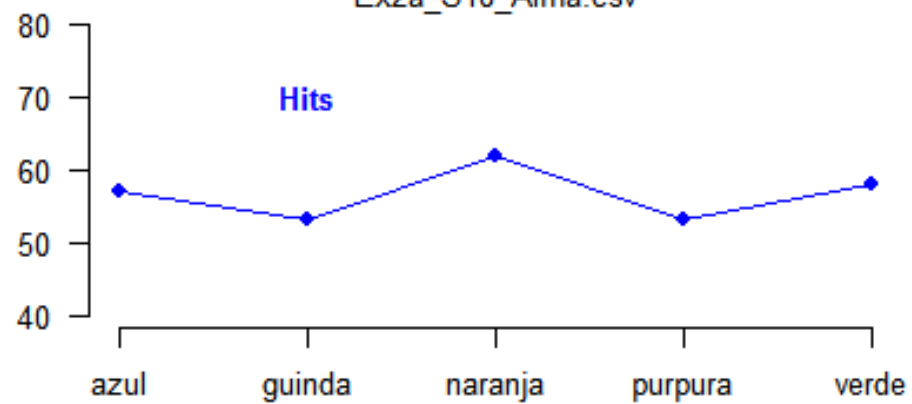
Ex2a_S3_PauRo.csv



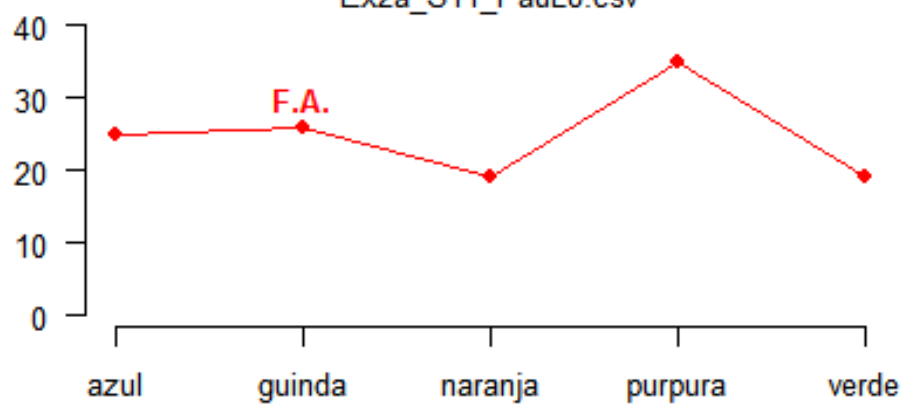
Ex2a_S11_PauLo.csv



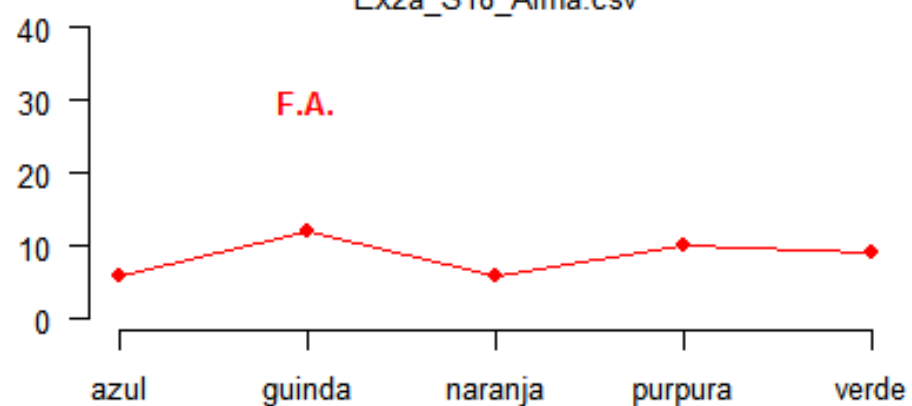
Ex2a_S18_Alma.csv



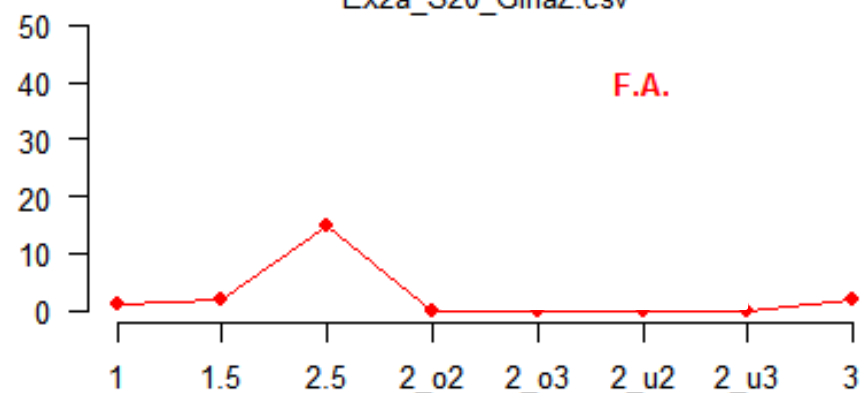
Ex2a_S11_PauLo.csv



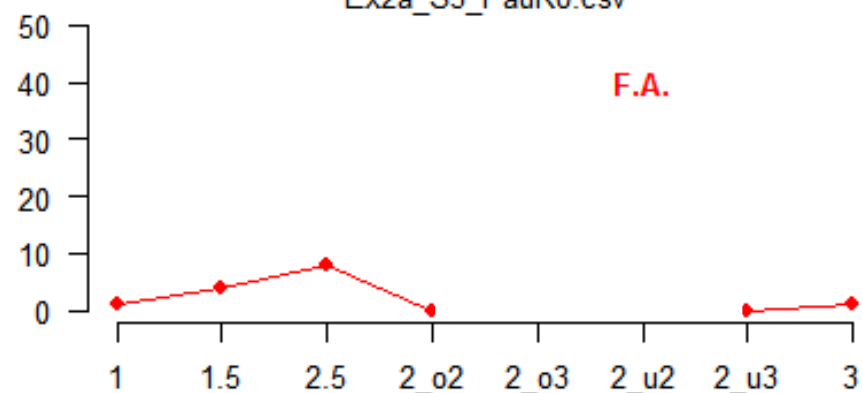
Ex2a_S18_Alma.csv



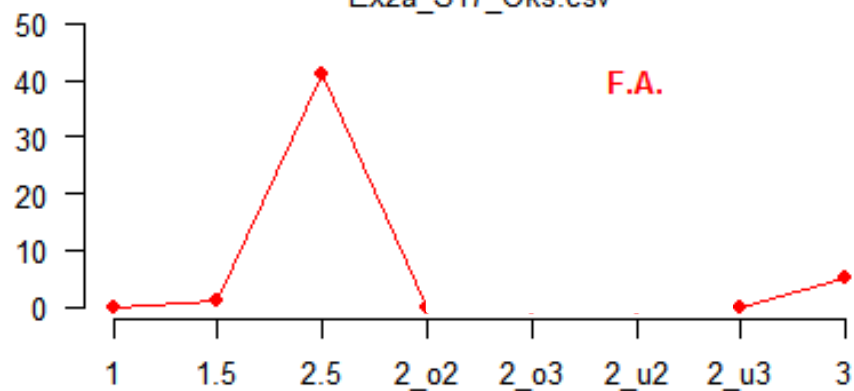
Ex2a_S20_GinaZ.csv



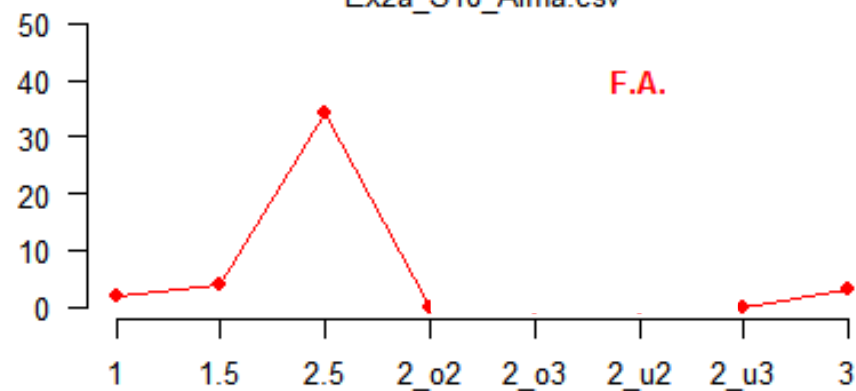
Ex2a_S3_PauRo.csv



Ex2a_S17_Oks.csv



Ex2a_S18_Alma.csv



4th: Evaluating the pattern

4th: Evaluating the pattern

Yes/No Task

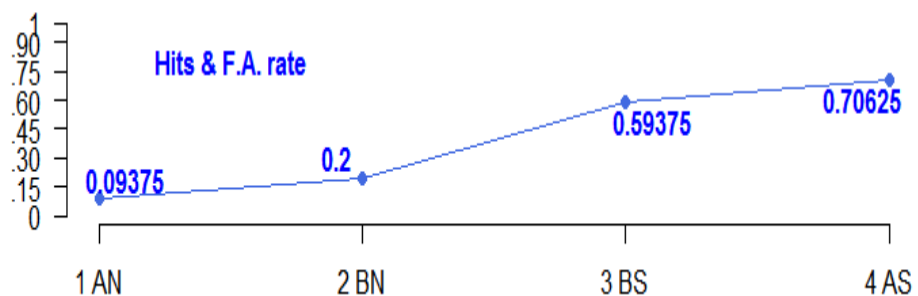
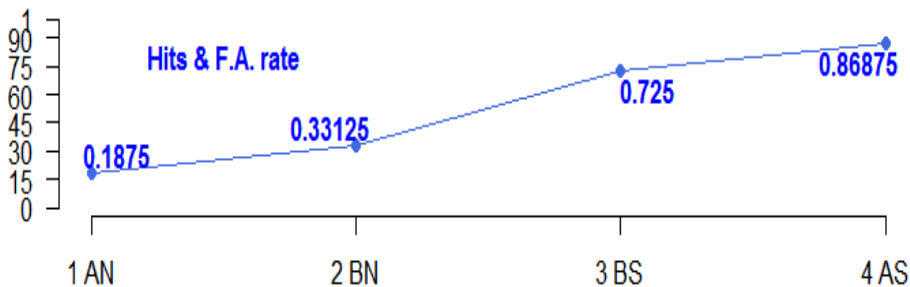
Ex2a_S8_IsaAn.csv

No.	30	53	116	139
Rate	0.1875	0.33125	0.725	0.86875
	AN	BN	BS	AS

Yes/No Task

Ex2a_S17_Oks.csv

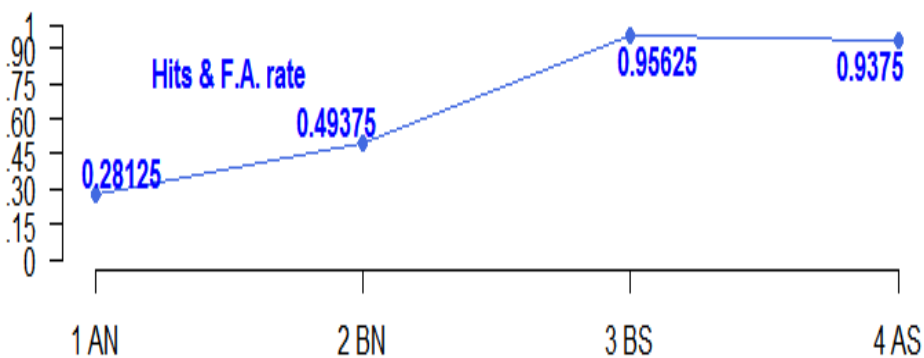
No.	15	32	95	113
Rate	0.09375	0.2	0.59375	0.70625
	AN	BN	BS	AS



Yes/No Task

Ex2a S11 PauLo.csv

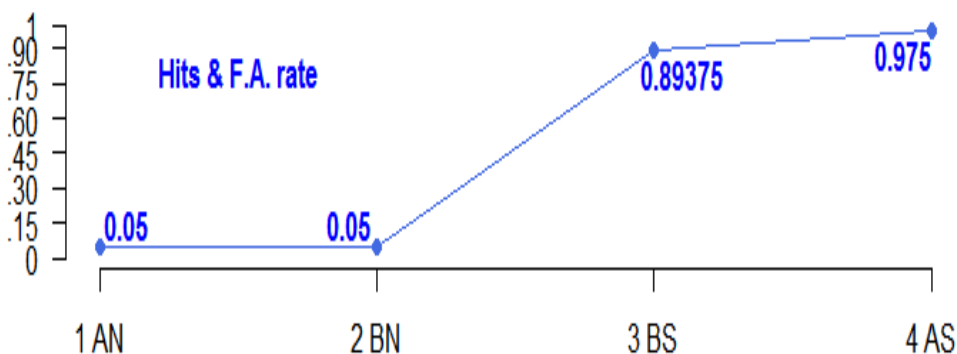
No.	45	79	153	150
Rate	0.28125	0.49375	0.95625	0.9375
	AN	BN	BS	AS



Yes/No Task

Ex2a S14 Jacq.csv

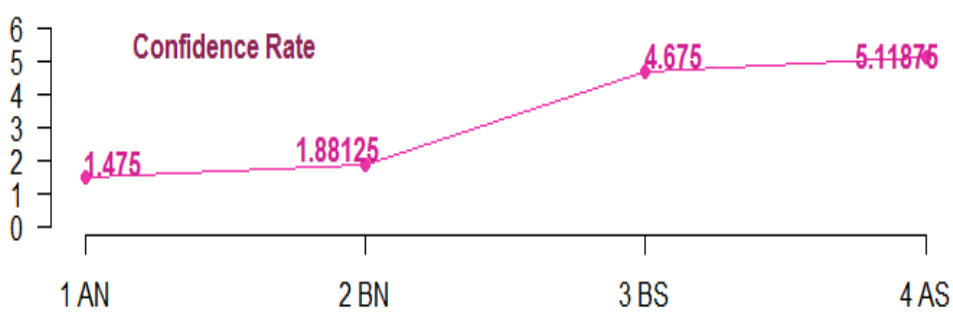
No.	8	8	143	156
Rate	0.05	0.05	0.89375	0.975
	AN	BN	BS	AS



Confidence Rating

Ex2a_S10_Jor.csv

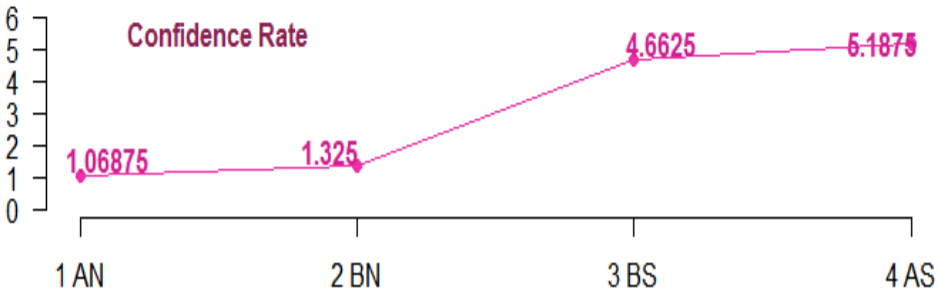
R(AN)	R(BN)	R(BS)	R(AS)
1.475	1.88125	4.675	5.11875



Confidence Rating

Ex2a_S4_DiRoj.csv

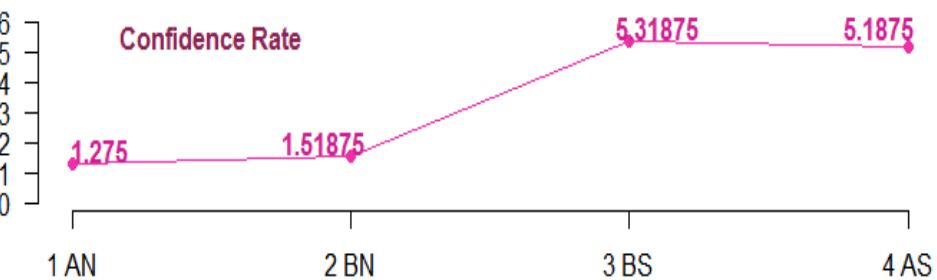
R(AN)	R(BN)	R(BS)	R(AS)
1.06875	1.325	4.6625	5.1875



Confidence Rating

Ex2a_S2_Tona.csv

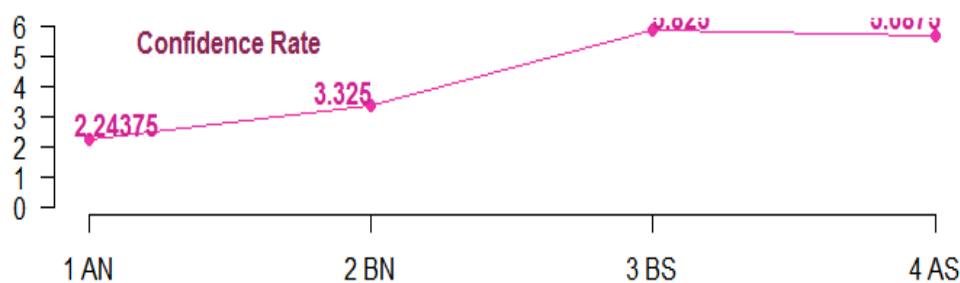
R(AN)	R(BN)	R(BS)	R(AS)
1.275	1.51875	5.31875	5.1875



Confidence Rating

Ex2a_S11_PauLo.csv

R(AN)	R(BN)	R(BS)	R(AS)
2.24375	3.325	5.825	5.6875



Ambiguity

Confidence Rating

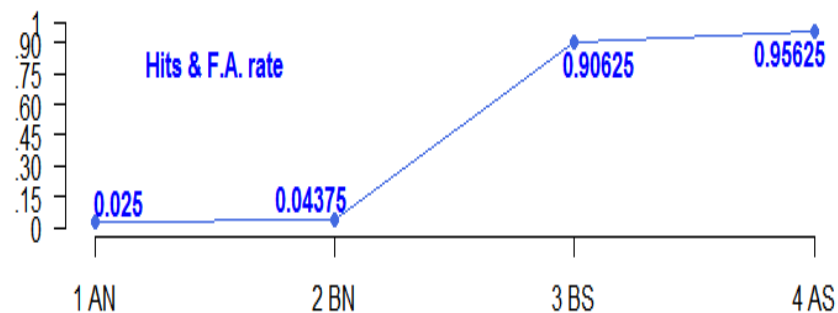
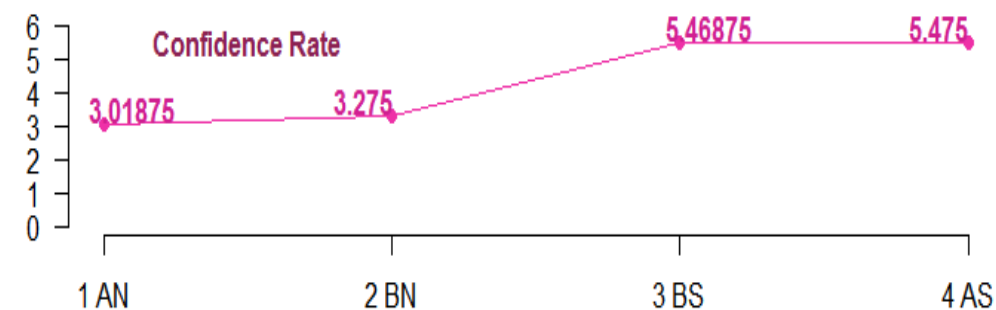
Ex2a_S5_DanFer.csv

R(AN)	R(BN)	R(BS)	R(AS)
3.01875	3.275	5.46875	5.475

Yes/No Task

Ex2a_S6_StePal.csv

No.	4	7	145	153
Rate	0.025	0.04375	0.90625	0.95625
	AN	BN	BS	AS



Yes/No Task

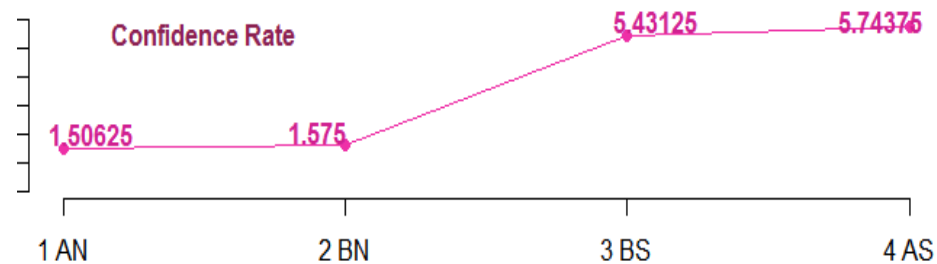
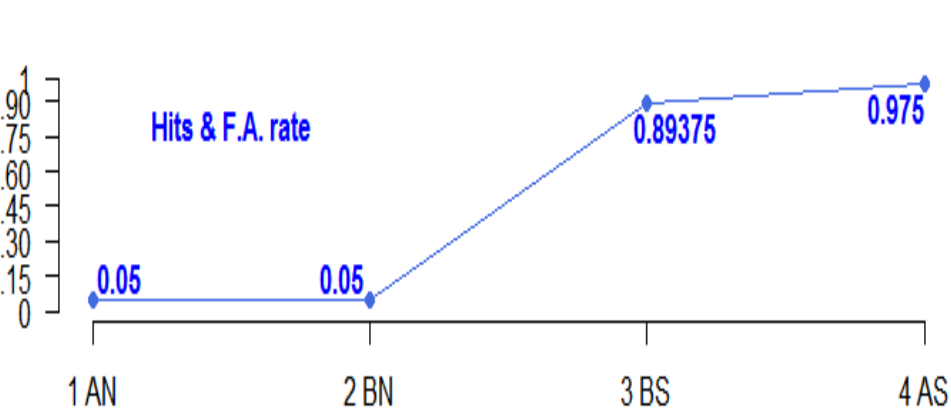
Ex2a_S14_Jacq.csv

	AN	BN	BS	AS
o	8	8	143	156
Rate	0.05	0.05	0.89375	0.975

Confidence Rating

Ex2a_S14_Jacq.csv

	R(AN)	R(BN)	R(BS)	R(AS)
	1.50625	1.575	5.43125	5.74375

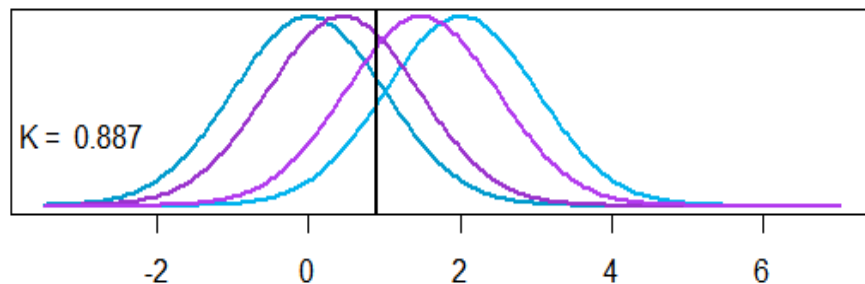


Distributions!

Mirror Effect

Ex2a_S8_IsaAn.csv

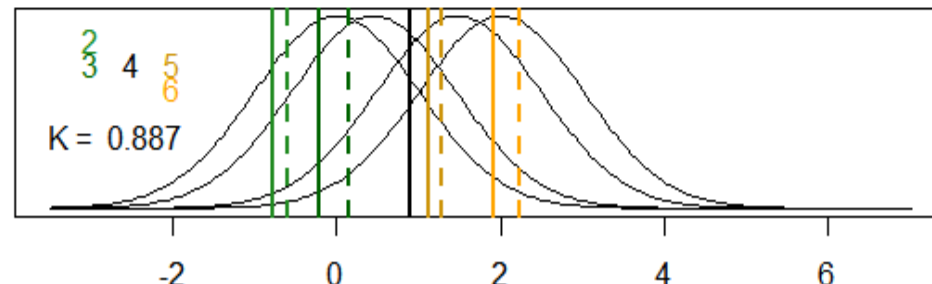
Rate No.	30	53	116	139
	0.188	0.331	0.725	0.869
	AN	BN	BS	AS



Confidence Rating

Ex2a_S8_IsaAn.csv

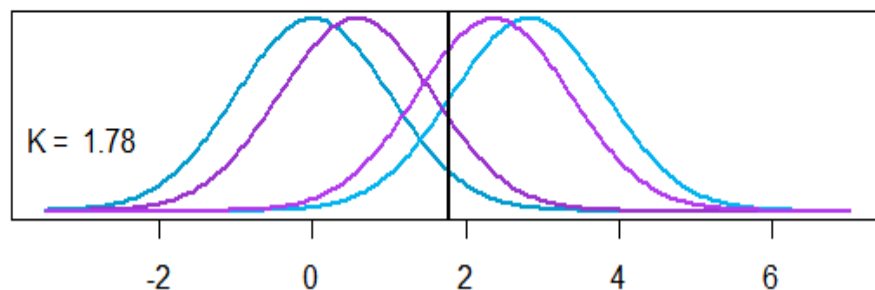
R(AN)	R(BN)	R(BS)	R(AS)
2.50625	3.15625	4.58125	4.96875



Mirror Effect

Ex2a S10 Jor.csv

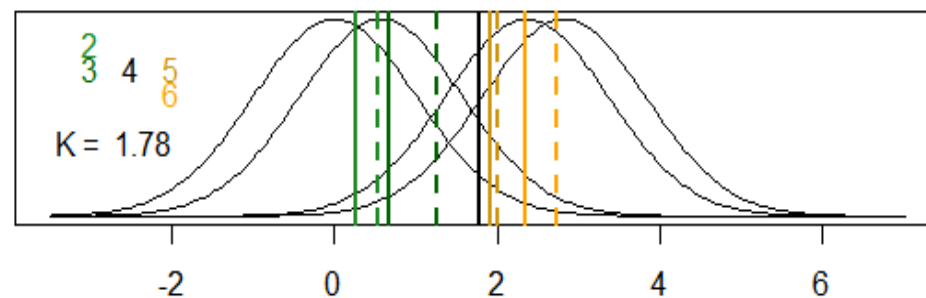
Rate No.	6	18	115	136
	0.038	0.112	0.719	0.85
	AN	BN	BS	AS



Confidence Rating

Ex2a S10 Jor.csv

R(AN)	R(BN)	R(BS)	R(AS)
1.475	1.88125	4.675	5.11875



Mirror Effect

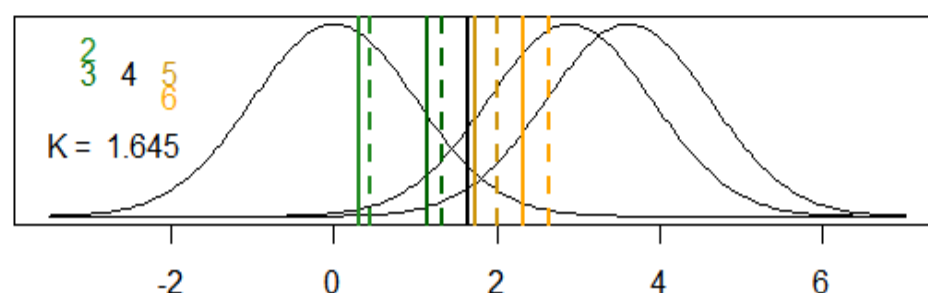
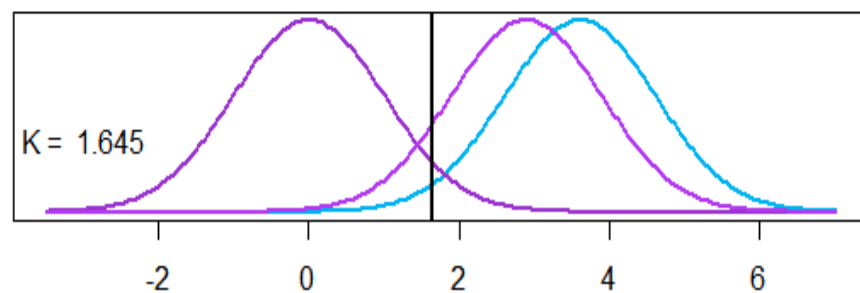
Ex2a_S14_Jacq.csv

Rate No.	8	8	143	156
	0.05	0.05	0.894	0.975
	AN	BN	BS	AS

Confidence Rating

Ex2a_S14_Jacq.csv

R(AN)	R(BN)	R(BS)	R(AS)
1.50625	1.575	5.43125	5.74375



Mirror Effect

Ex2a_S11_PauLo.csv

Rate No.	AN	BN	BS	AS
	45	79	153	150
	0.281	0.494	0.956	0.938

Confidence Rating

Ex2a_S11_PauLo.csv

R(AN)	R(BN)	R(BS)	R(AS)
2.24375	3.325	5.825	5.6875

