Priming distributivity
The case of adjectival predicates

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(work with Emmanuel Chemla and Benjamin Spector)

Linguae
May 17th - 2017

Phenomena

Transitive Mixed Predicates

(1) Mora and Milica built a sand castle.

Non-Distributive reading (Collective reading)

Mora and Milica jointly built a single sand castle without each separately doing so.

Distributive reading

Mora built a sand castle, Milica built another sand castle.

Adjectival Mixed Predicates

(2) The bags are heavy.

Non-Distributive reading (Collective reading)

The total weight of the bags is heavy without each bag being heavy.

Distributive reading

The weight of each bag is individually heavy (and therefore the total weight is heavy as well)

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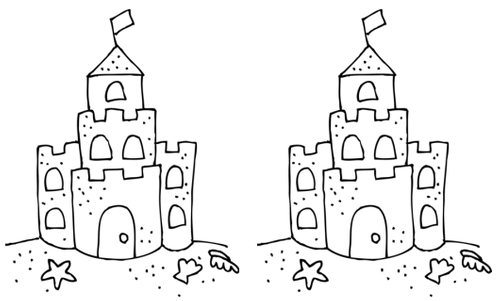

distributivity results on covariation of castles!

Adjectival Mixed Predicates

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Non-Distributive reading (Collective reading)

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Distributive reading

The weight of each bag is individually heavy (and therefore the total weight is heavy as well)

distributivity does not result in covariation!

Phenomenon I: Transitive predicates

(1) Mora and Milica built a sand castle.

Non-Distributive reading (Collective reading)

Mora and Milica jointly built a single sand castle without each separately doing so.

Distributive reading

Mora built a sand castle, Milica built another sand castle.

Covert distributive operator *D* (cf. *each* in English), which applies the predicate to each atomic member of the subject.

Mora and Milica D built a sand castle.

$\forall x.(x \preceq_{AT} Mora \oplus Milica) \rightarrow \exists y.sandcastle'(y) \wedge built'(x, y)$

- *D* guarantees here the distributive entailment.
- *D* allows covariation (variables and operators in the VP are applied to each member of the subject)

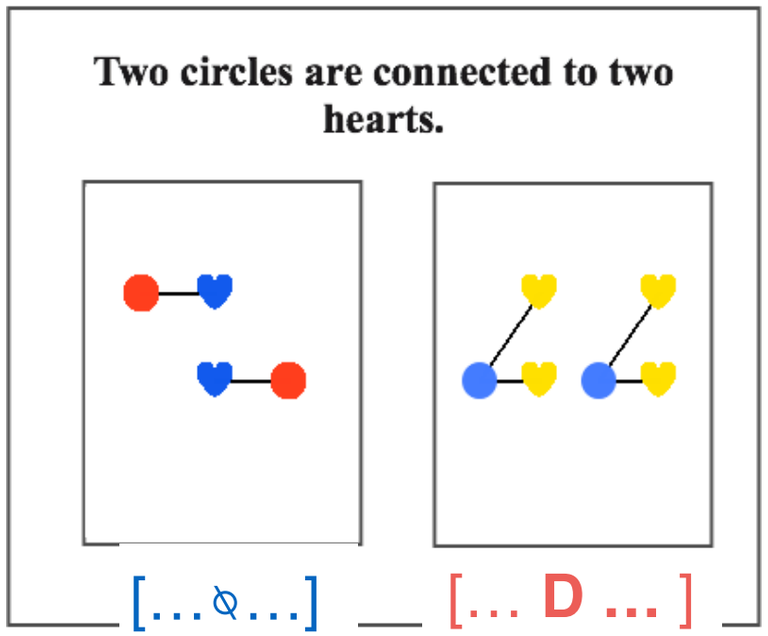
Priming of distributivity with covariation

Does the distributive/non-distributive contrast give rise to priming effects?

Maldonado, Chemla and Spector 2017

Sentence-picture matching task

Target



Priming of distributivity with covariation

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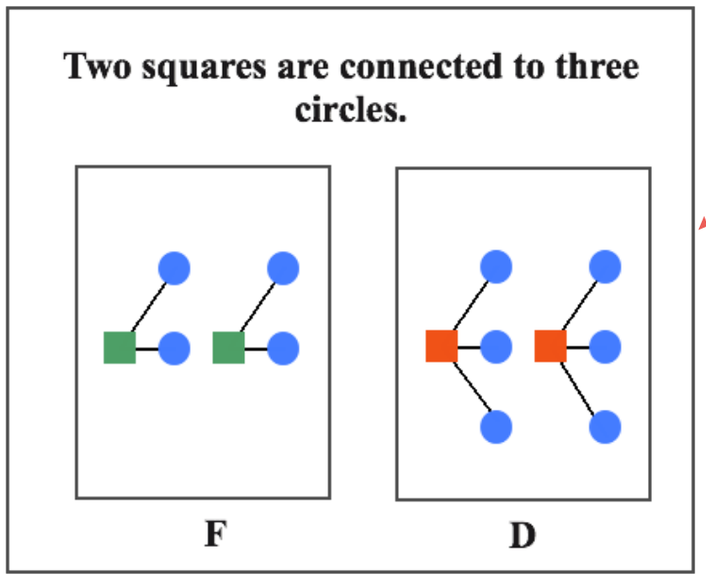
Maldonado, Chemla and Spector 2017

Sentence-picture matching task

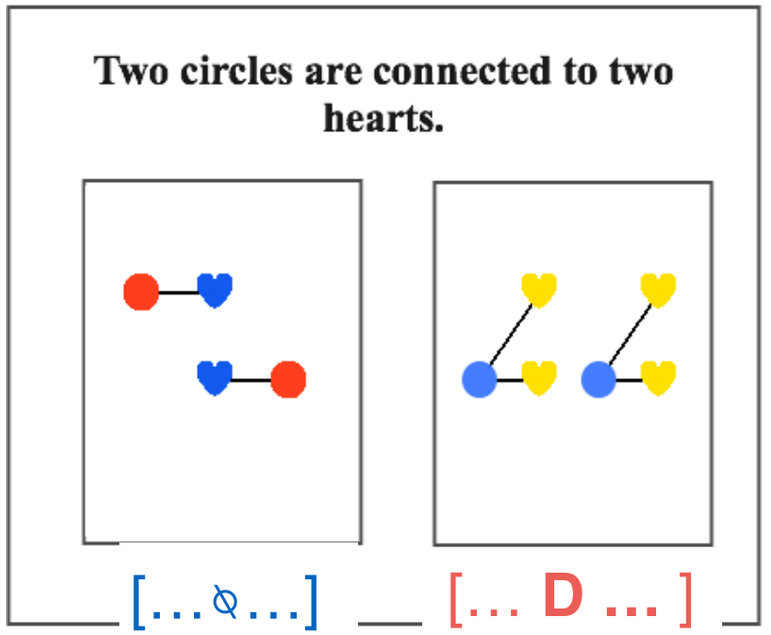
Primes (N-1)

Target

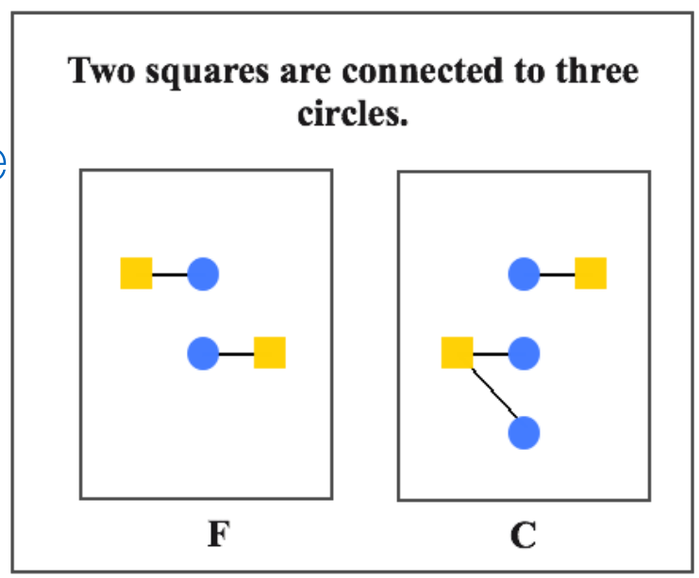
Distributive prime



[… **D** …]



Non-distributive prime

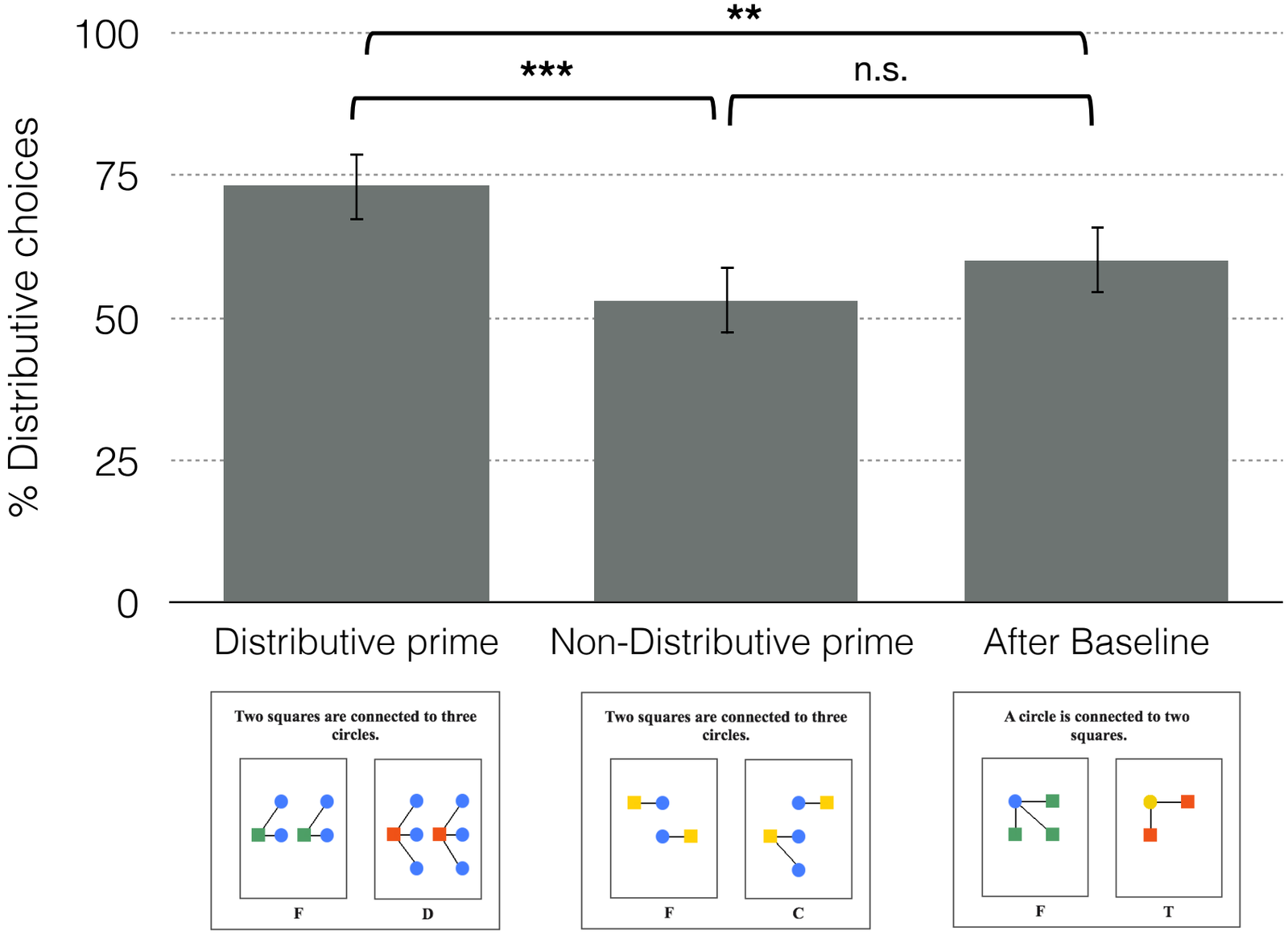


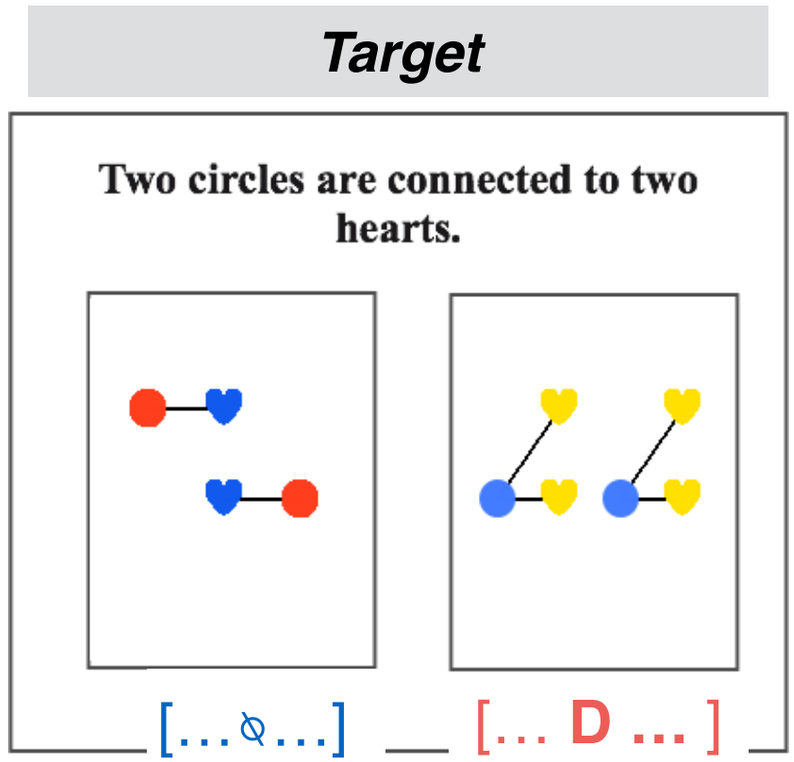
[… ⊘ …]

Priming of distributivity with covariation

Does the distributive/non-distributive contrast give rise to priming effects?

Maldonado, Chemla and Spector 2017





Potential confound: Dissociate priming of distributive readings from priming of a verification strategy involving covariation of the objects named in the sentence.

Goal

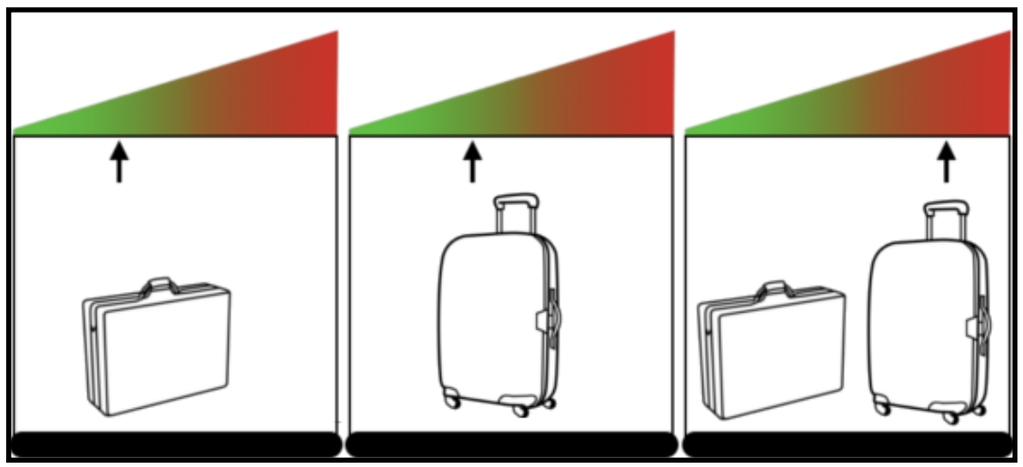
Dissociate distributivity from covariation.

Can we find a processing signature of distributive readings in absence of covariation?

a. Remove potential confound in previous work.
b. Address the relation between distributive readings and specific verification strategies.

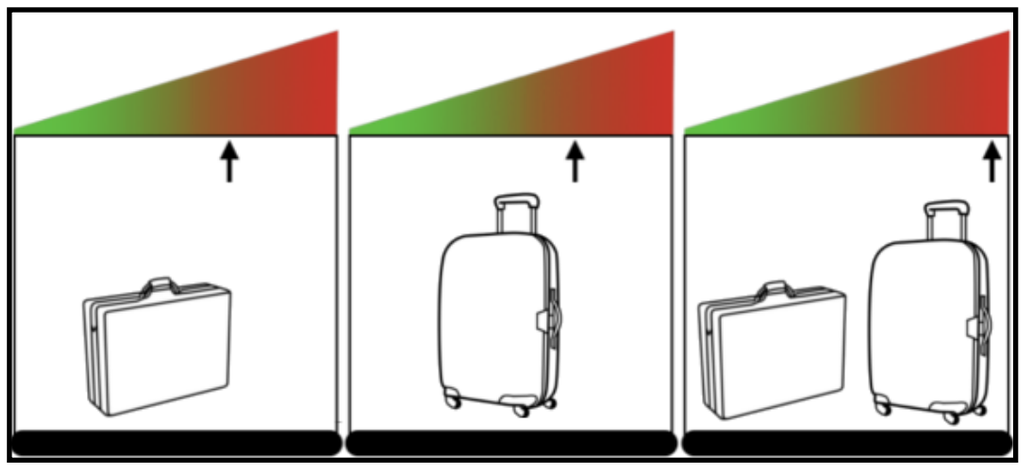
Phenomenon II: Adjectival predicates

(2) The bags are <u>heavy</u>.



Collective reading

The total weight of bags is heavy.
The plurality of bags is heavy without each of them being heavy.



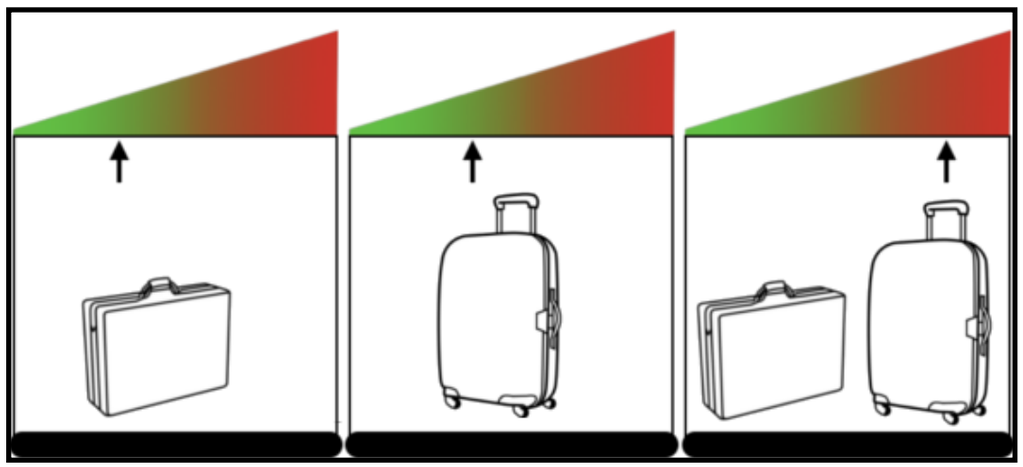
Distributive reading
Collective reading

Each bag is heavy, thus the total weight of bags is heavy.
The plurality of bags is heavy and each of them is heavy.

Distributive reading entails Collective reading.

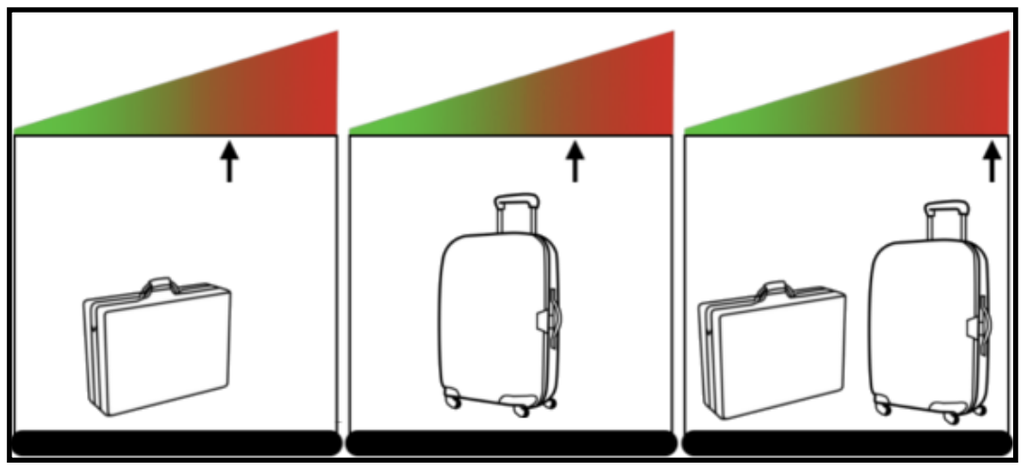
Phenomenon II: Adjectival predicates

(2) The bags are <u>light</u>.



Distributive reading

The weight of each individual bag is light
Each bag is light without the plurality of bags being light.



Distributive reading
Collective reading

The total weight is light, thus the weight of each bag is light.
Each bag is light and the plurality of bags is light.

Collective reading entails Distributive reading.

Similar behaviour: Expensive/Cheap; Quiet/Noisy

Phenomenon II: Adjectival predicates

	Positive Adjective	**Negative Adjective**
	The bags are heavy.	*The bags are light.*
Collective reading	Weak	Strong
Distributive reading	Strong	Weak

Distributive readings can also be derived by applying the *D* operator:

The bags D are light.
$\forall x.(x \preceq_{AT} \iota x.bags'(x)) \rightarrow light'(x, y)$

Goal

Dissociate distributivity from covariation.

Can we find a processing signature of distributive readings in absence of covariation?

Does the distributive/collective ambiguity for adjectival predicates give rise to priming effects?

a. Remove potential confound in previous work.
b. Address the relation between distributive readings and specific verification strategies.

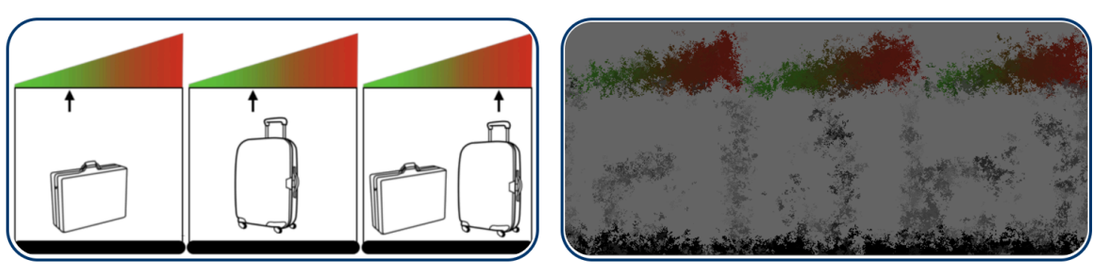
Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

Targets (Trial N+2)

Collective Target

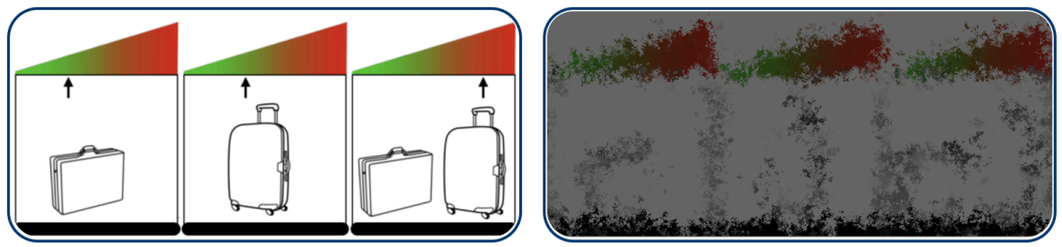
The bags are heavy.



Press D *Press K*

Distributive Target

The bags are light.



Press D *Press K*

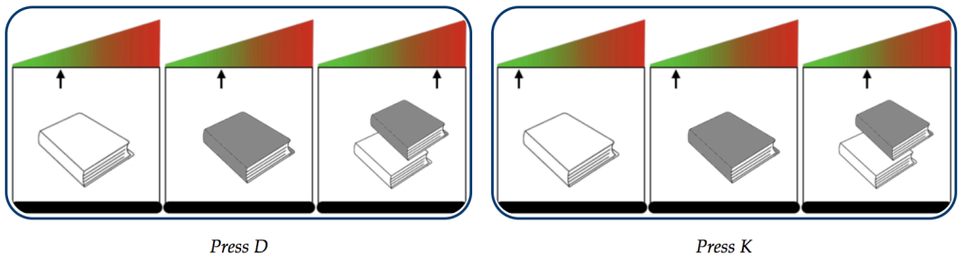
Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

Primes (Trial N)

Collective Prime

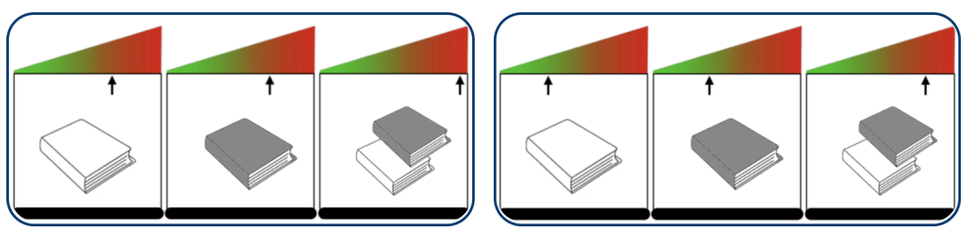
The books are heavy.



Press D *Press K*

Distributive Prime

The books are light.

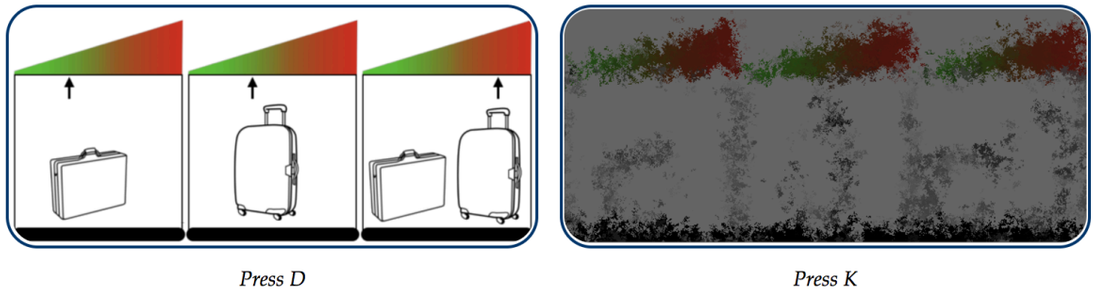


Press D *Press K*

Targets (Trial N+1)

Collective Target

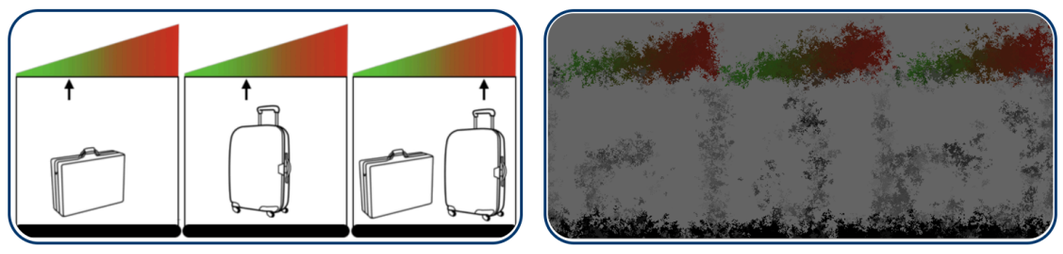
The bags are heavy.



Press D *Press K*

Distributive Target

The bags are light.



Press D *Press K*

Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

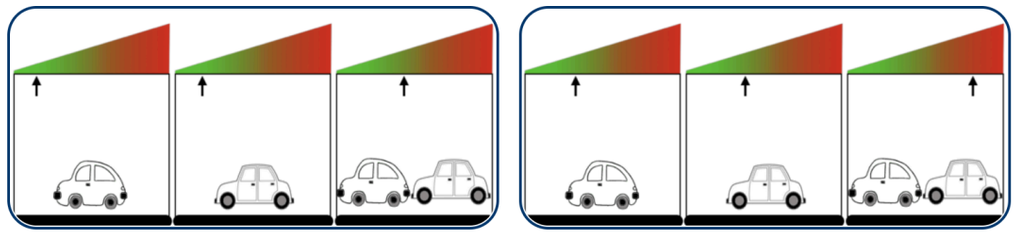
different dimensions

Primes (Trial N)

Targets (Trial N+1)

Collective Prime

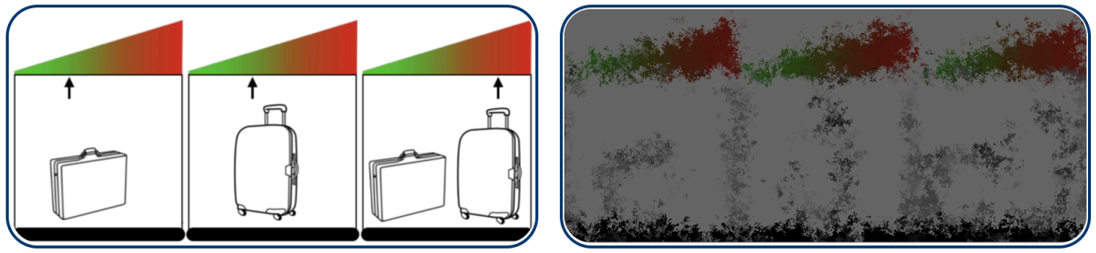
The cars are expensive.



Press D *Press K*

Collective Target

The bags are heavy.

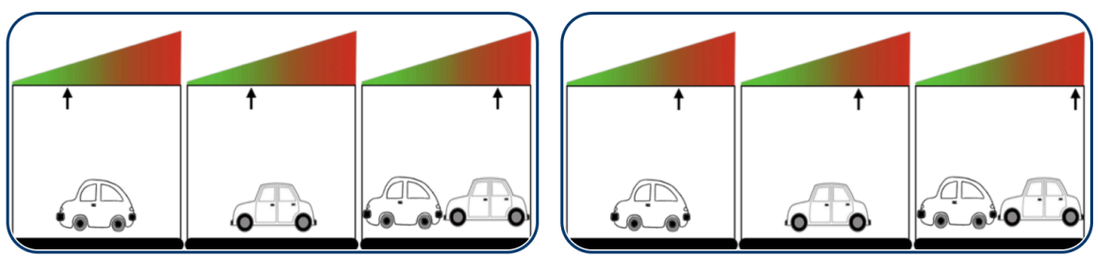


Press D *Press K*

*

Distributive Prime

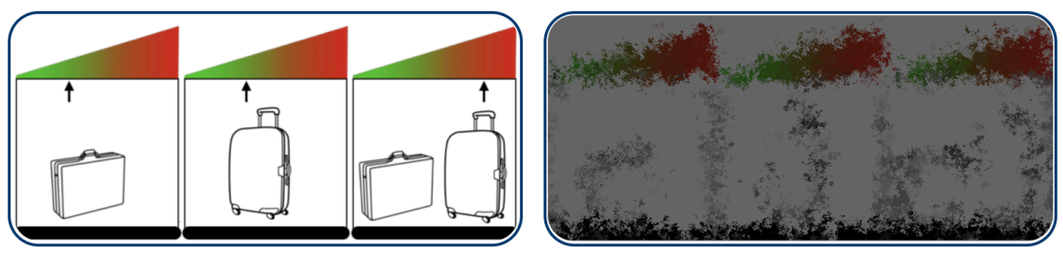
The cars are cheap.



Press D *Press K*

Distributive Target

The bags are light.



Press D *Press K*

Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

Primes (Trial N)

Collective Prime

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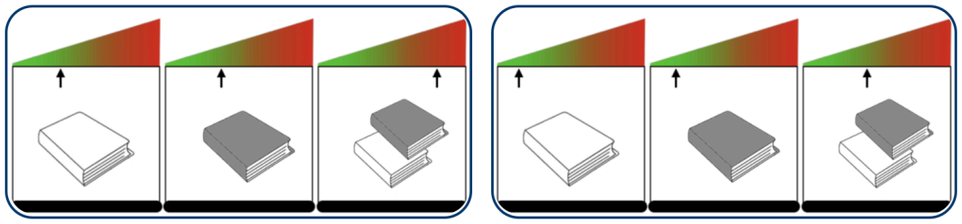
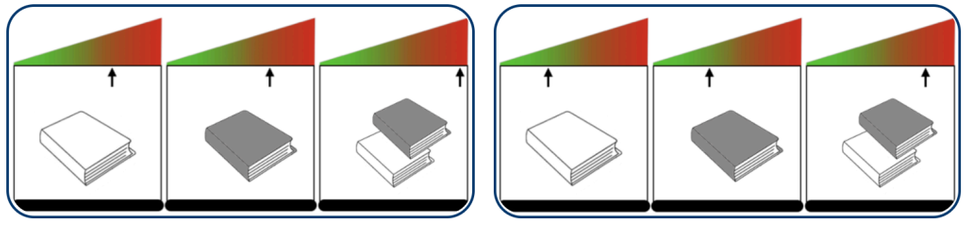


Press D *Press K*

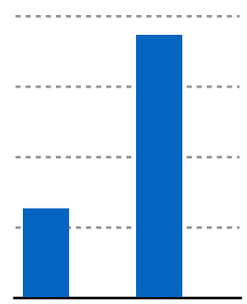
Distributive Prime

The books are light.



Press D *Press K*

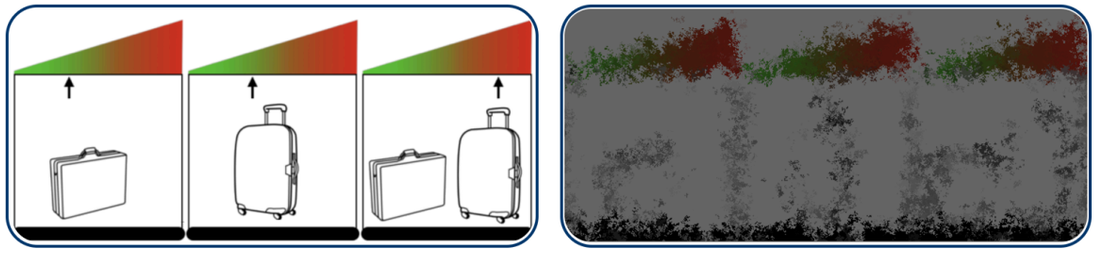
Targets (Trial N+1)



Less "blur" responses

Collective Target

The bags are heavy.



Press D *Press K*

makes the collective reading true (weak)

compatible with both readings or with none of them

More "blur" responses

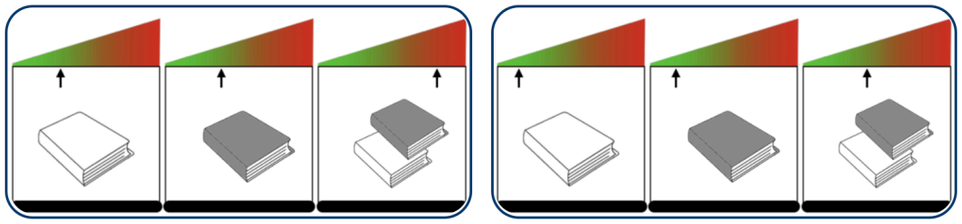
Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

Primes (Trial N)

Collective Prime

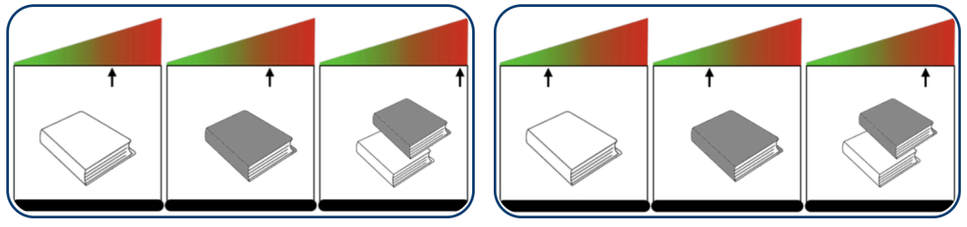
The books are heavy.



Press D *Press K*

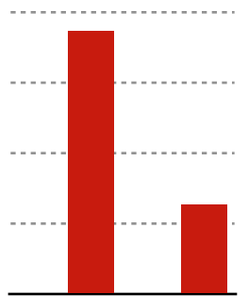
Distributive Prime

The books are light.



Press D *Press K*

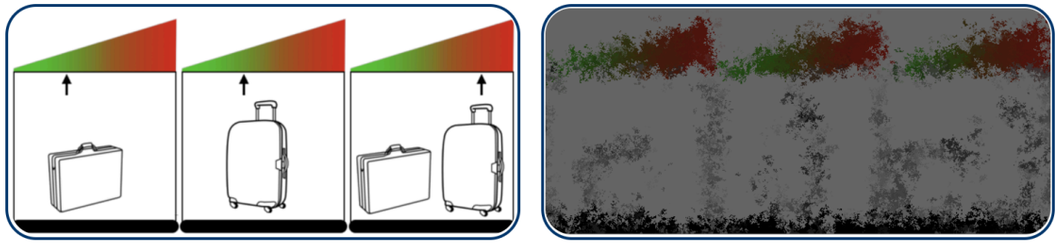
Targets (Trial N+1)



More "blur" responses

Distributive Target

The bags are light.



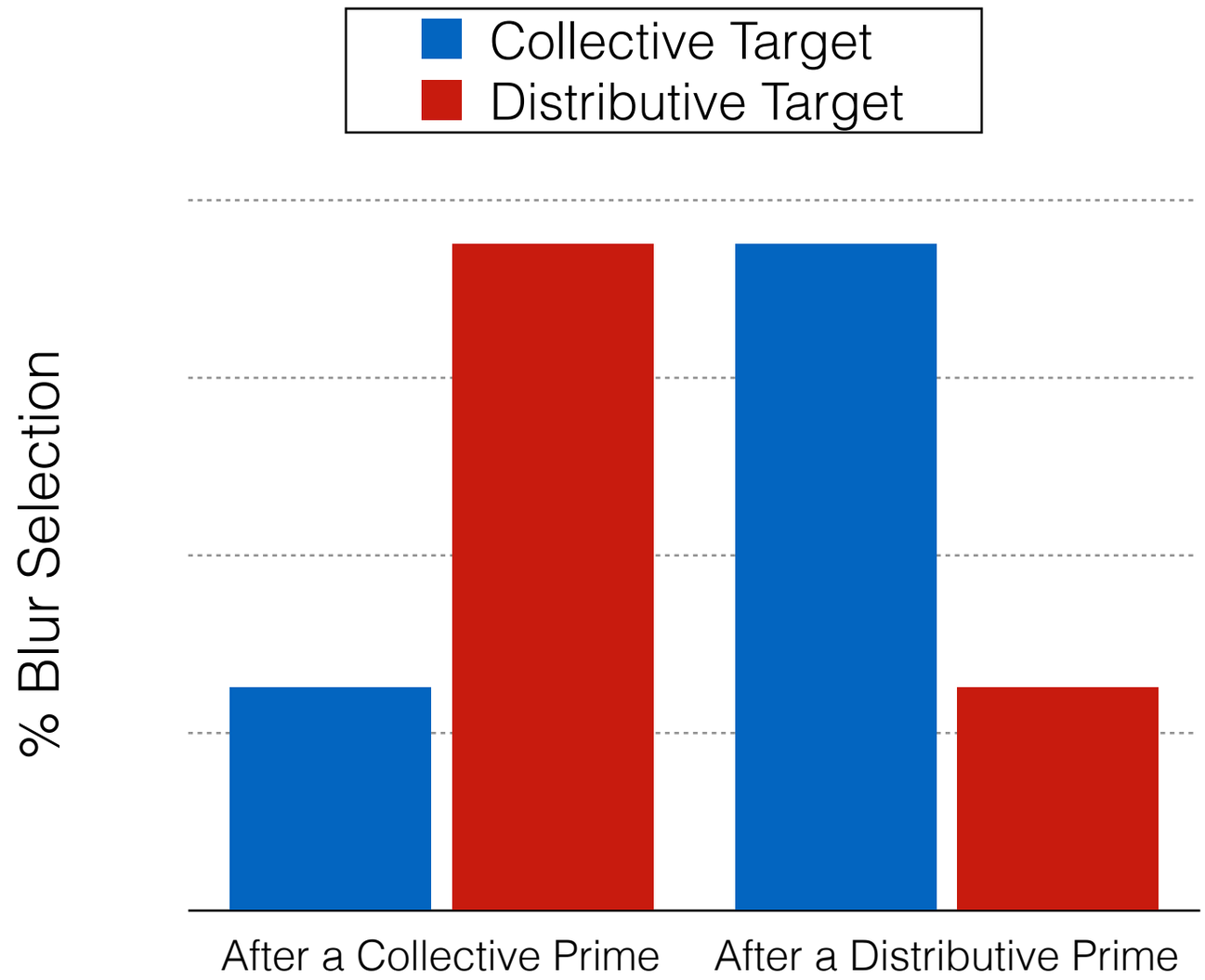
Press D *Press K*

makes the distributive reading true (weak)

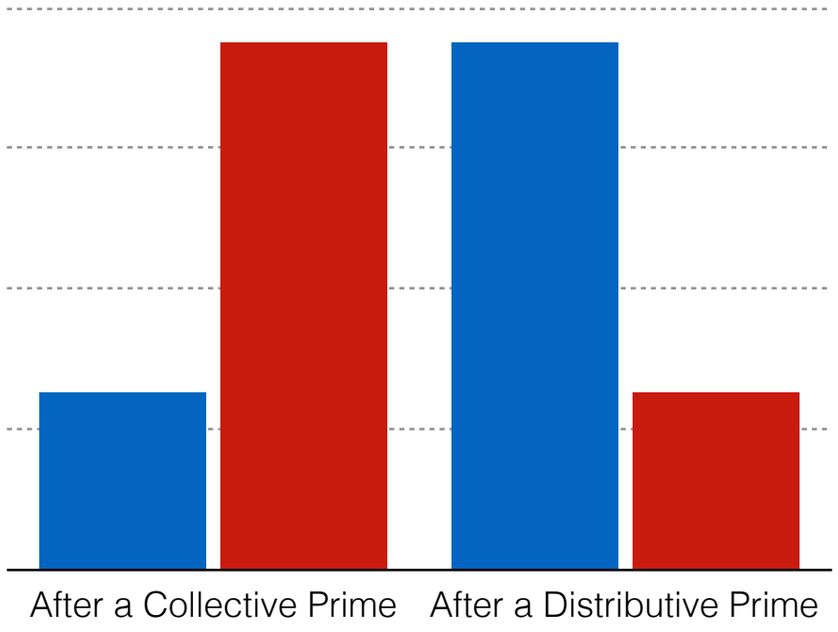
compatible with both readings or with none of them

Less "blur" responses

Experiment 1: Predictions

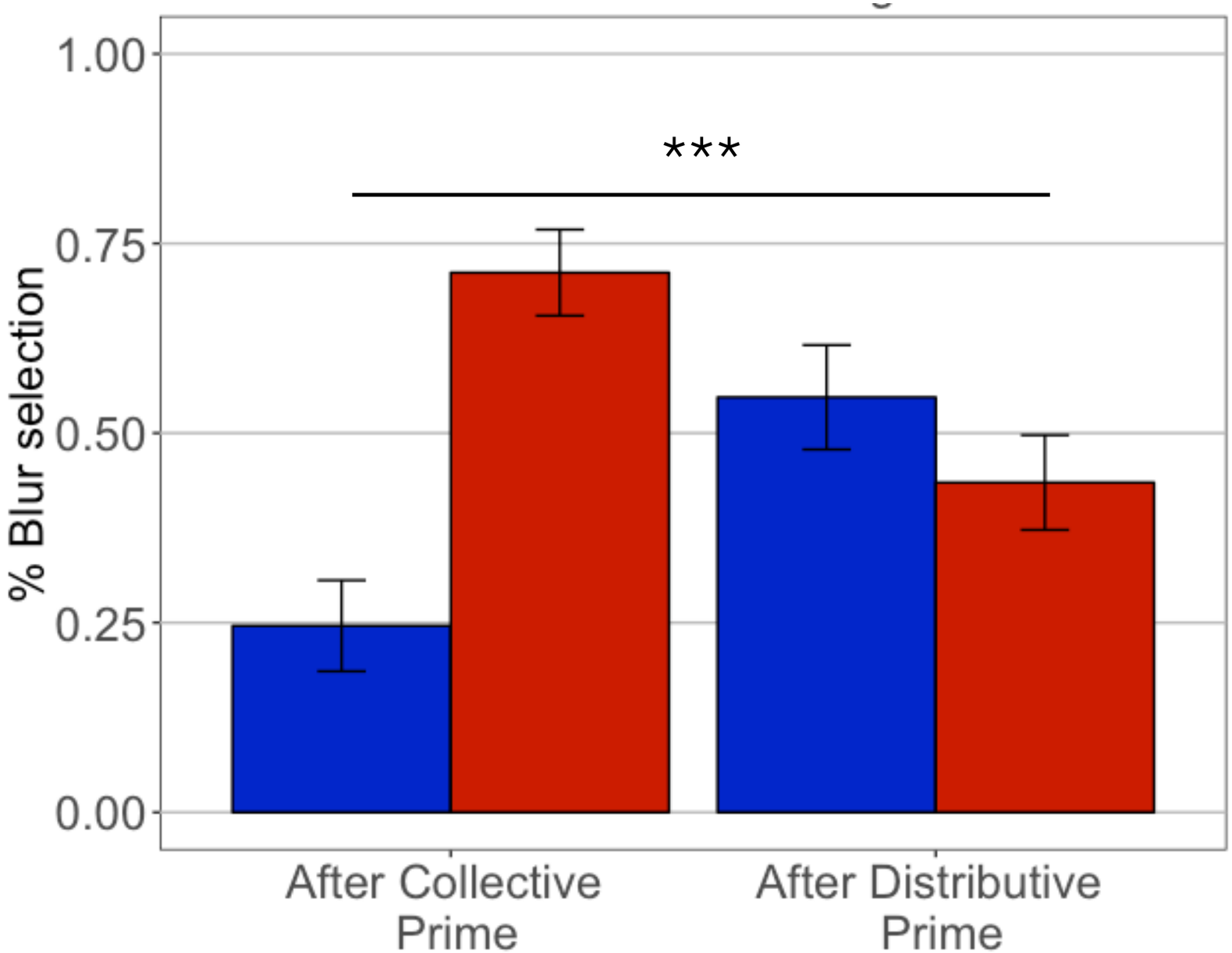


Experiment 1: Results (N=33)



Collective Target
Distributive Target

Significant Interaction
Target Condition * Prime Condition
p<.001



Experiment 2: Baseline rates and verification strategies

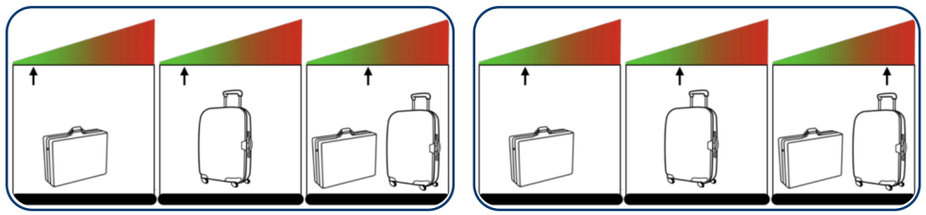
Is there priming in both directions?

Primes (Trial N)

Targets (Trial N+1)

Collective Prime

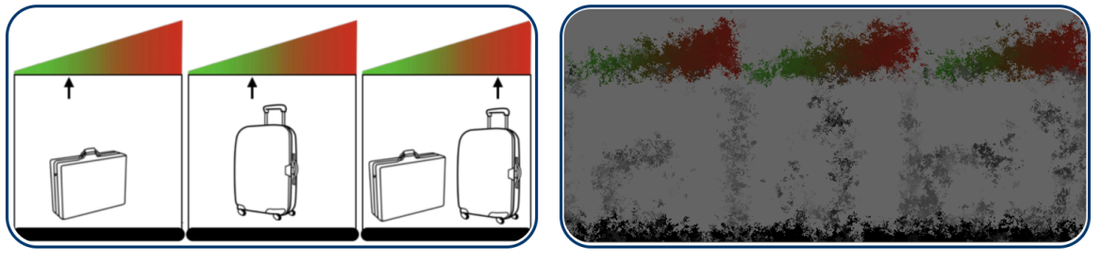
The bags are heavy.



Press D *Press K*

Collective Target

The bags are heavy.

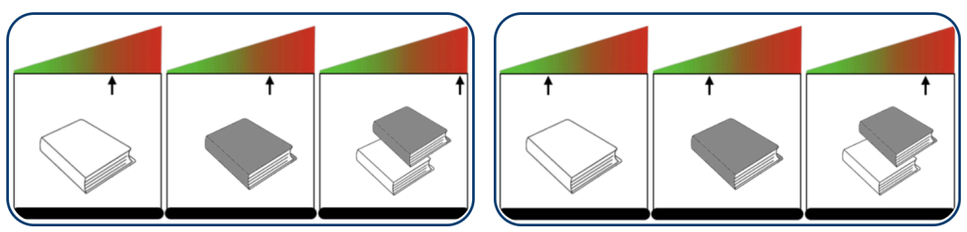


Press D *Press K*

*

Distributive Prime

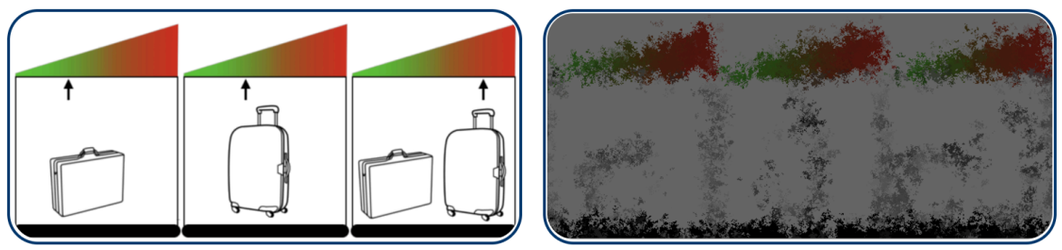
The books are light.



Press D *Press K*

Distributive Target

The bags are light.



Press D *Press K*

Experiment 2: Baseline rates and verification strategies

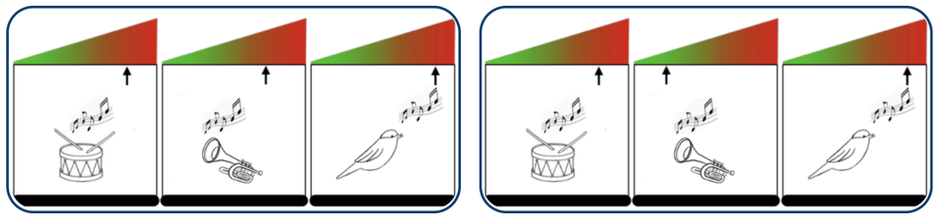
Is there priming in both directions?

Baselines (Trial N)

Targets (Trial N+1)

C-Baseline

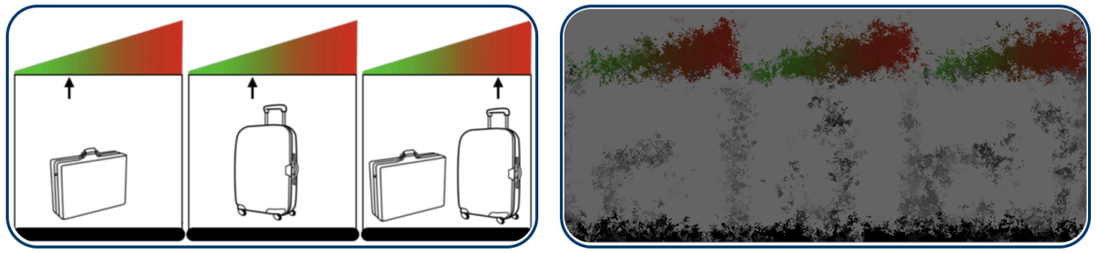
The trumpet is quiet.



Press D *Press K*

Collective Target

The bags are heavy.

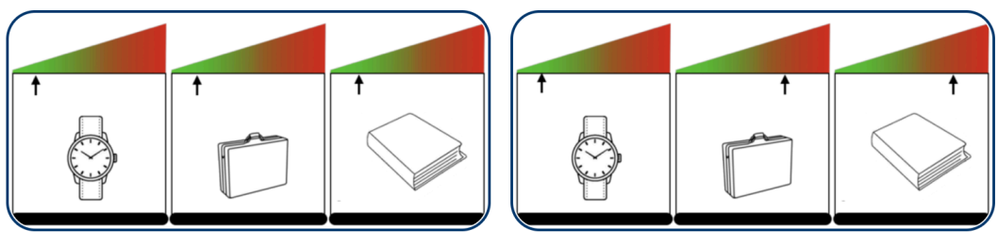


Press D *Press K*

*

D-Baseline

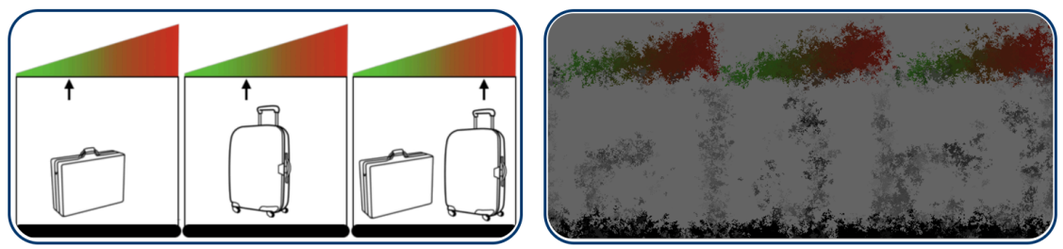
Only the watch is cheap.



Press D *Press K*

Distributive Target

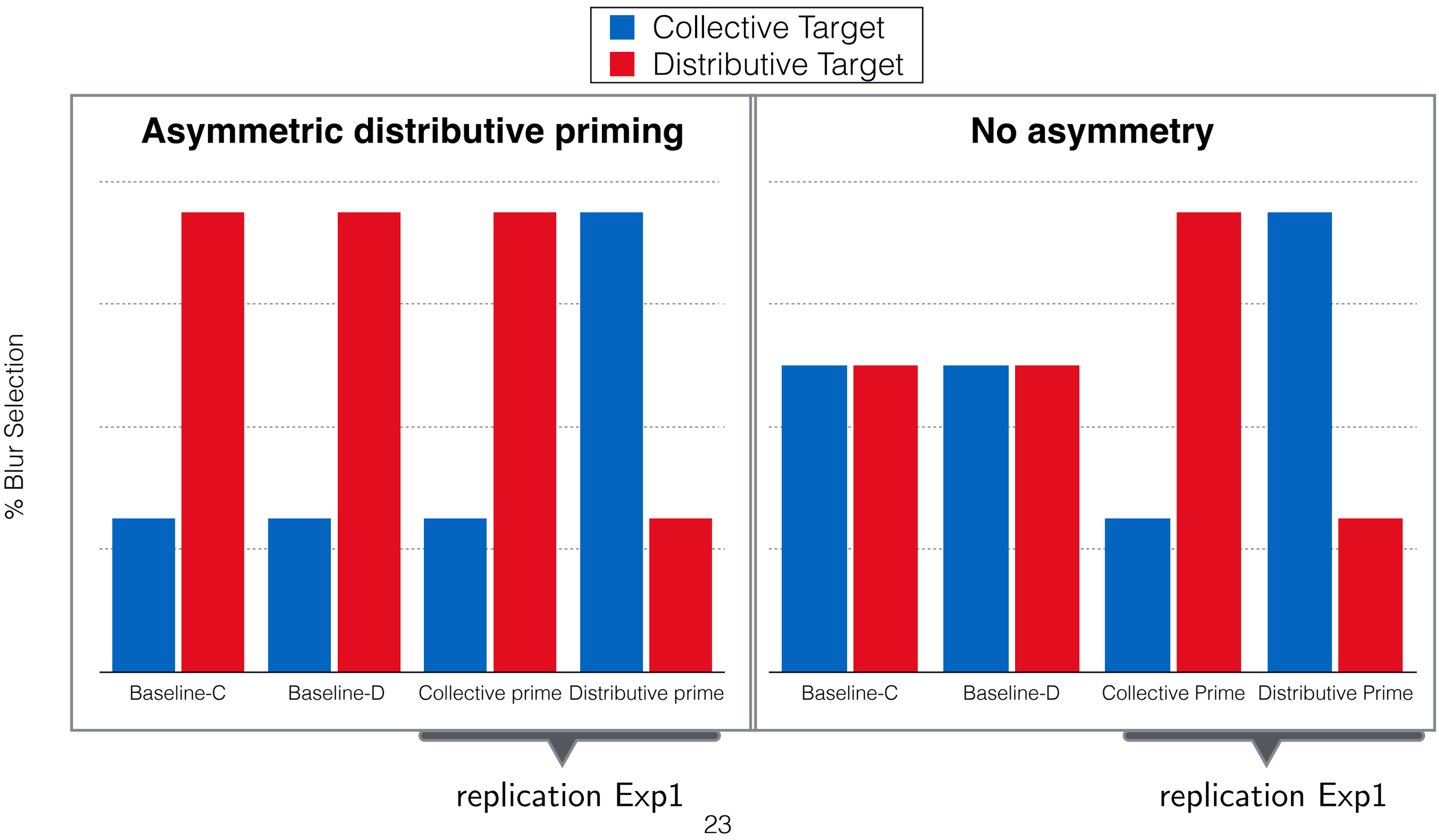
The bags are light.



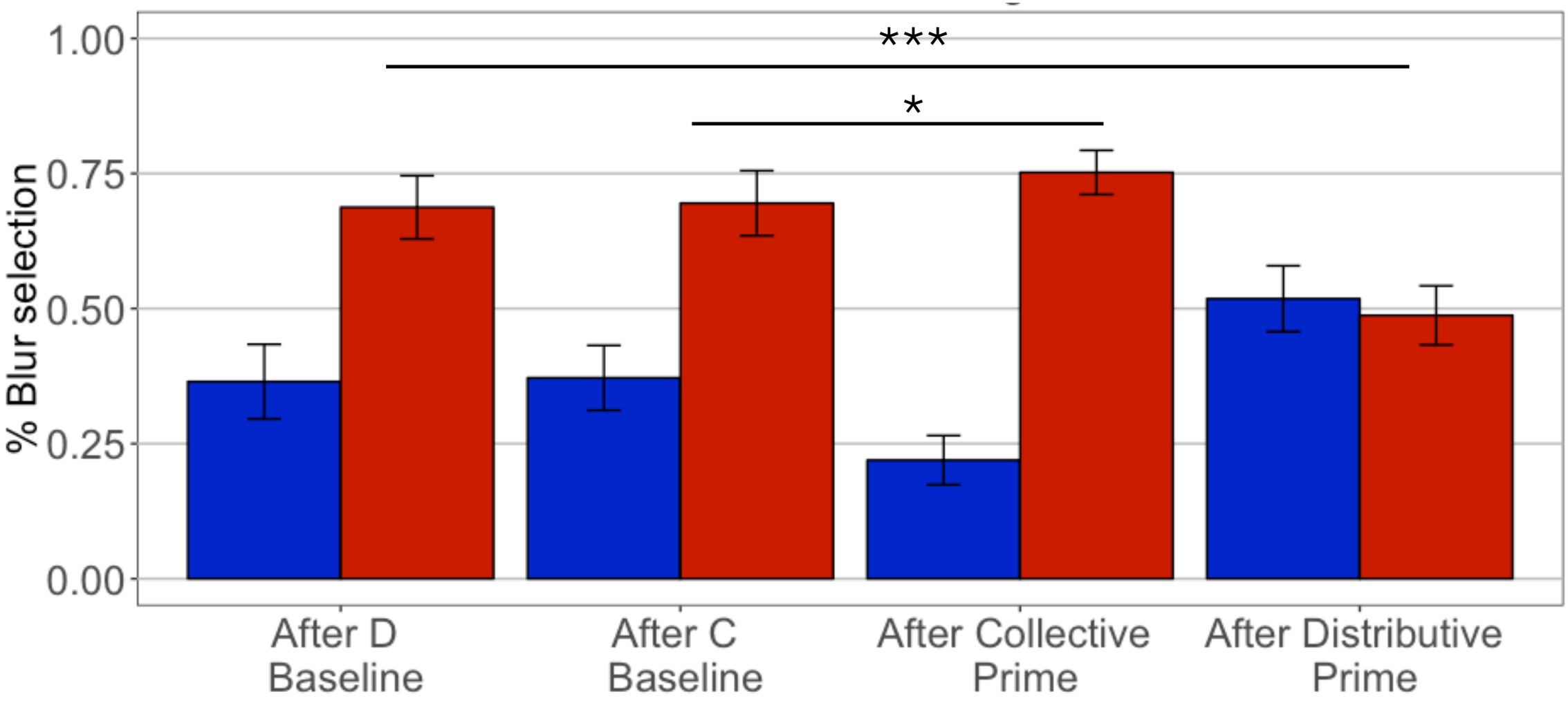
Press D *Press K*

Experiment 2: Predictions

Is there priming in both directions?



Experiment 2: Results (N=41)



- Overall interaction
- Collective prime vs. Distributive prime: Interaction Prime Condition* Target Condition (rep. Exp1)
- Baseline-C vs. Distributive prime: Interaction Prime Condition* Target Condition
- Baseline-D vs. Collective prime: Interaction Prime Condition* Target Condition

Discussion

- The distributive/collective contrast in sentences involving mixed predicates gives rise to priming effects:
  - New contrast in priming studies: collective vs. distributive readings.
  - Distributive readings can be primed independently of a verification strategy based on covariation.

- Priming effect in both directions (collective and distributive) but asymmetric strength (cf. previous studies)

- Semantic representations can be specifically primed independently of whether they give rise to strong or weak readings (i.e. weak distributive readings prime strong distributive readings)

Follow-up

Are the mechanisms used to derive distributive readings the same in transitive and adjectival cases?

Can we prime distributivity *across* predicate types?

Thanks for your attention

Extras

Priming plural ambiguities with mixed adjectives

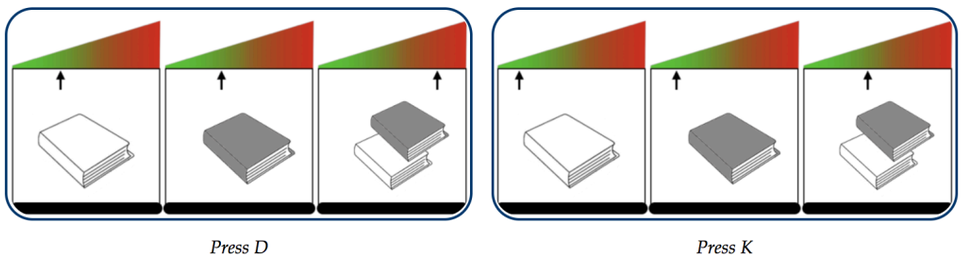
Sentence-picture matching task

Primes (Trial N)

Targets (Trial N+1)

Collective Prime

The books are heavy.

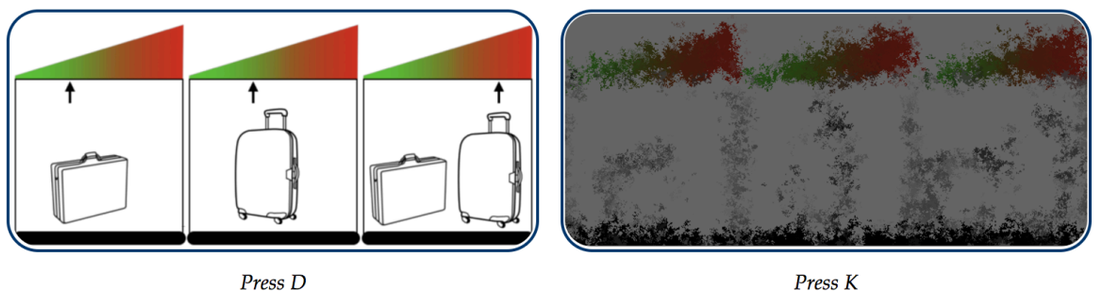


makes the collective reading true (weak)

makes no reading true

Collective Target

The bags are heavy.



makes the collective reading true (weak)

compatible with both readings or with none of them

Decrease Blur selection

Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

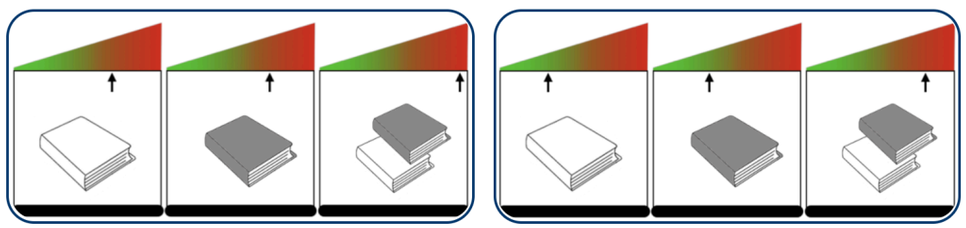
Primes (Trial N)

Targets (Trial N+1)

Decrease Blur selection

Distributive Prime

The books are light.



Press D

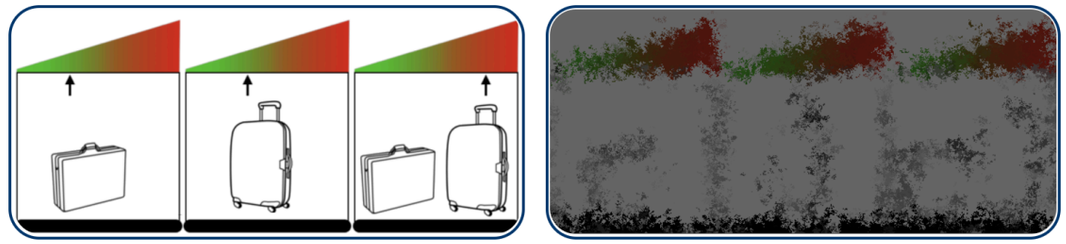
Press K

makes no reading true

makes the distributive reading true (weak)

Distributive Target

The bags are light.



Press D

Press K

makes the distributive reading true (weak)

compatible with both readings or with none of them

Priming plural ambiguities with mixed adjectives

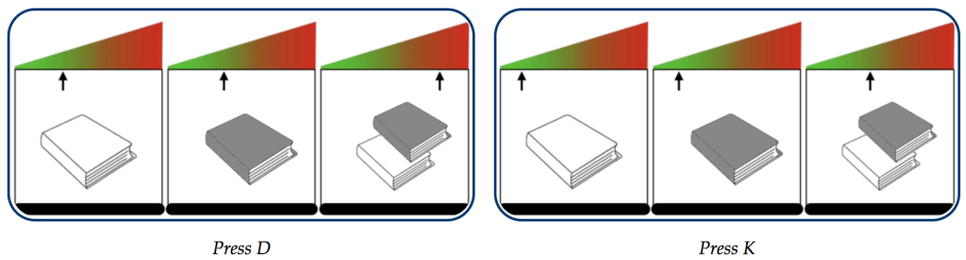
Sentence-picture matching task

Primes (Trial N)

Targets (Trial N+1)

Collective Prime

The books are heavy.



Press D *Press K*

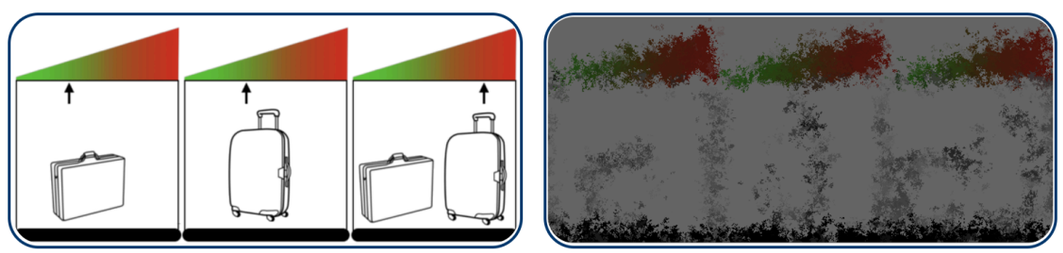
makes the collective reading true (weak)

makes no reading true

Increase Blur selection

Distributive Target

The bags are light.



Press D *Press K*

makes the distributive reading true (weak)

compatible with both readings or with none of them

Priming plural ambiguities with mixed adjectives

Sentence-picture matching task

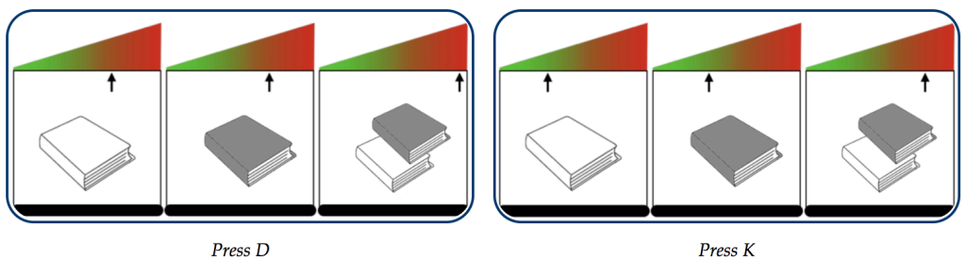
Primes (Trial N)

Targets (Trial N+1)

Increase Blur selection

Distributive Prime

The books are light.

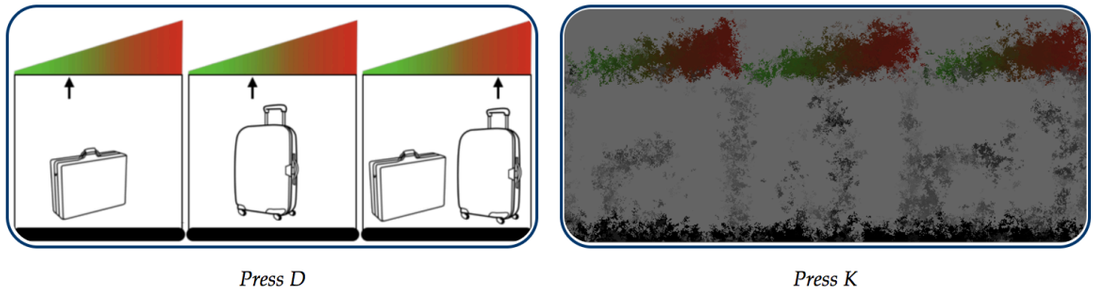


makes no reading true

makes the distributive reading true (weak)

Collective Target

The bags are heavy.

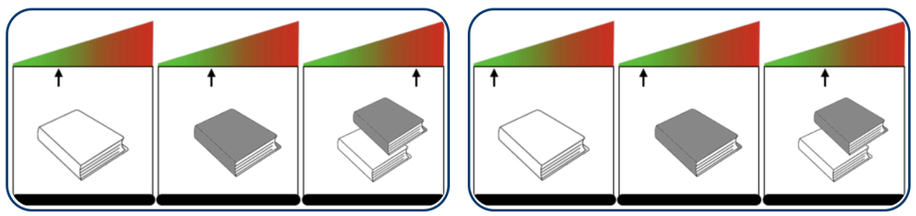


makes the collective reading true (weak)

compatible with either both readings or with none of them

Collective Prime

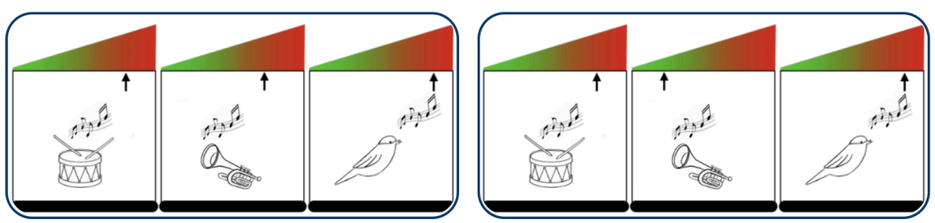
The books are heavy.



Press D *Press K*

C- Baseline

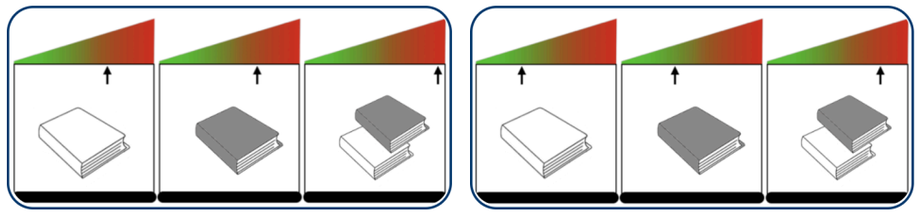
The trumpet is quiet.



Press D *Press K*

Distributive Prime

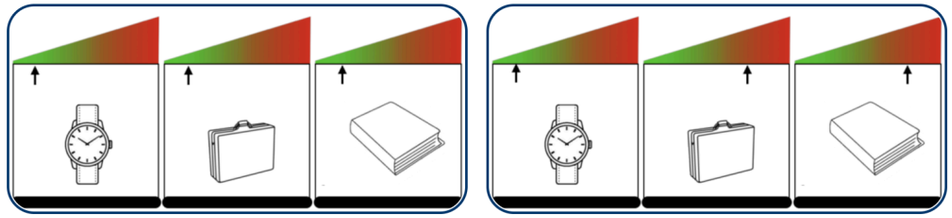
The books are light.



Press D *Press K*

D- Baseline

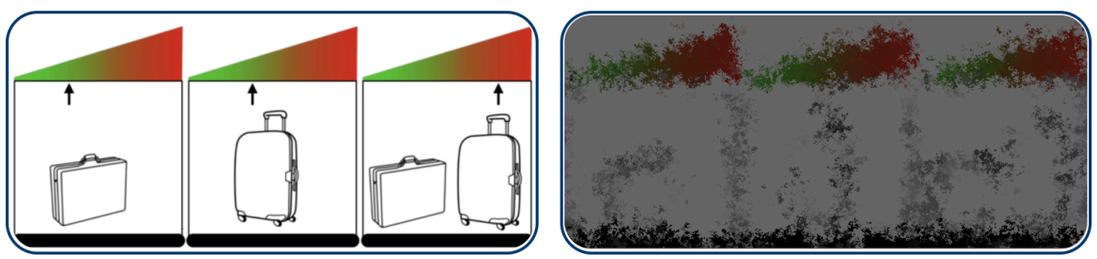
Only the watch is cheap.



Press D *Press K*

Collective Target

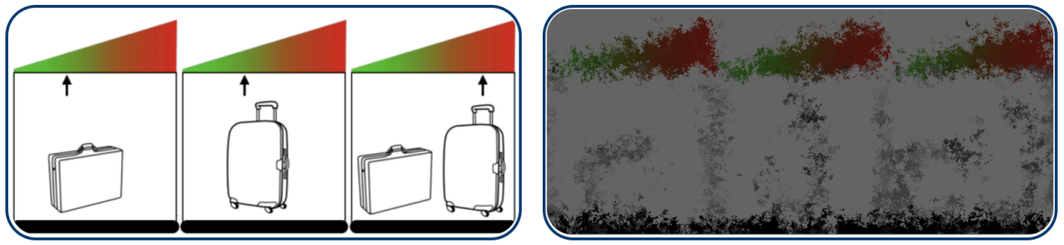
The bags are heavy.



Press D *Press K*

Distributive Target

The bags are light.



Press D *Press K*

Phenomenon I

Transitive predicates: Distributivity with covariation

Applying the *D* operator does not force covariation. But, distributive readings can only be clearly isolated in covariation scenarios.

(1') Mora and Milica painted a sand castle.

Mora and Milica painted a sand castle.

$\exists y.sandcastle'(y) \wedge painted'(x, y)$

Collective reading

Mora and Milica jointly painted a single sand castle without each separately doing so.

Cumulative reading (assuming lexical cumulativity)

Mora and Milica painted the same sand castle.

Mora and Milica D painted a sand castle.

$\forall x.(x \preceq_{AT} Mora \oplus Milica) \rightarrow \exists y.sandcastle'(y) \wedge painted'(x, y)$

Distributive reading with covariation (indefinite narrow scope, surface scope)

Mora painted a sand castle, Milica painted a potentially different sand castle.

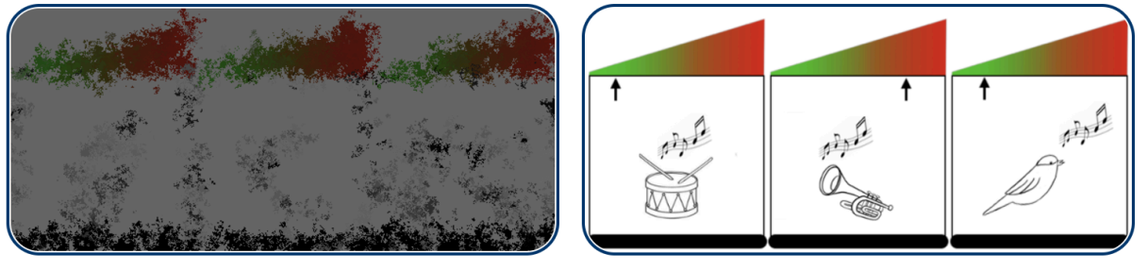
Distributive reading without covariation (indefinite wide scope, inverse scope)

Mora painted a sand castle, Milica painted the same sand castle.

Experiments 1 and 2
Control trials

Control-OVERT

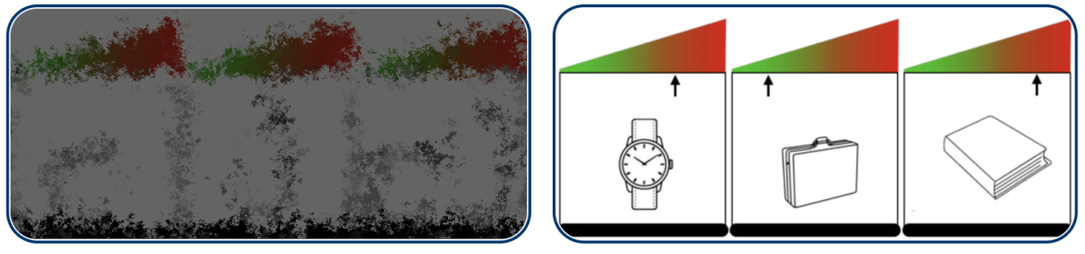
Only the trumpet is loud.



Press D *Press K*

Control-BLUR

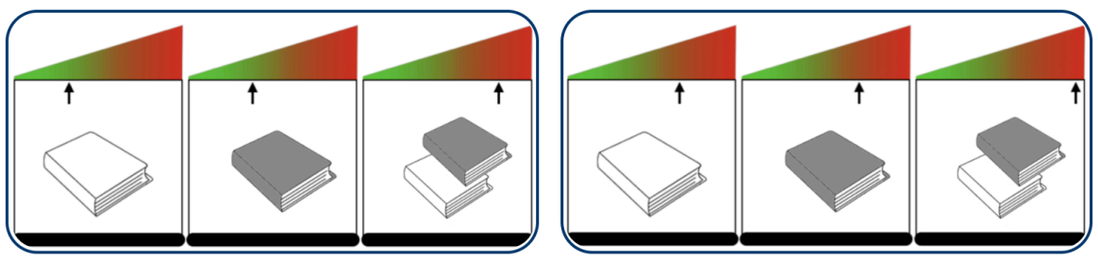
Only the bag is expensive.



Press D *Press K*

Control-BOTH-C

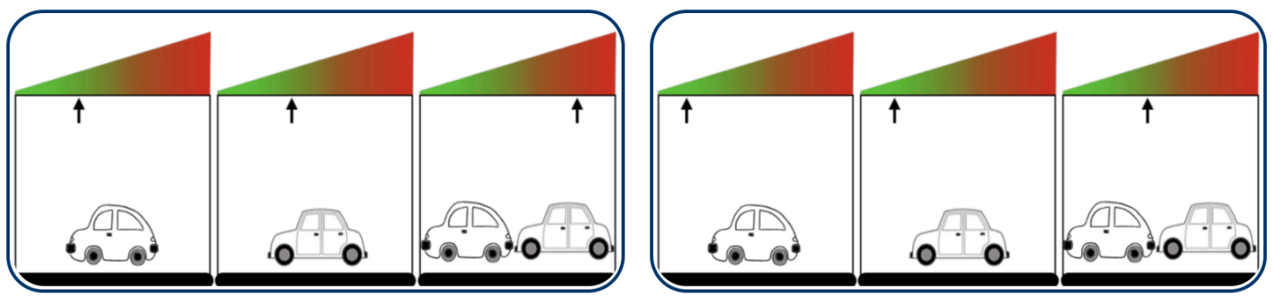
The books are heavy.



Press D *Press K*

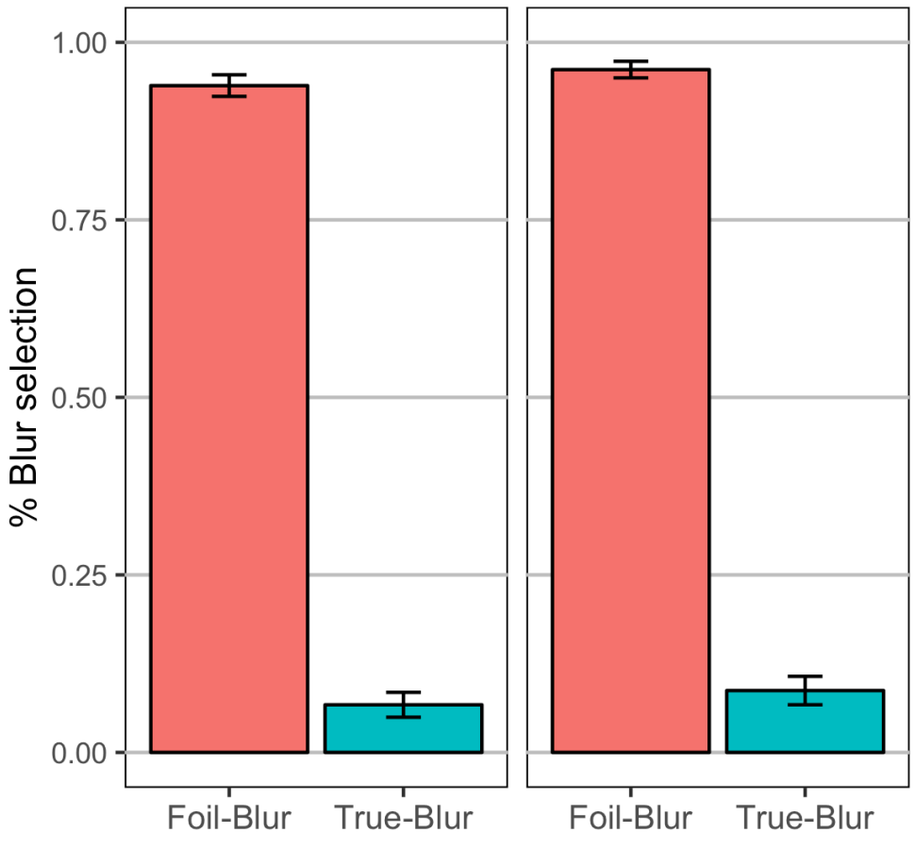
Control-BOTH-D

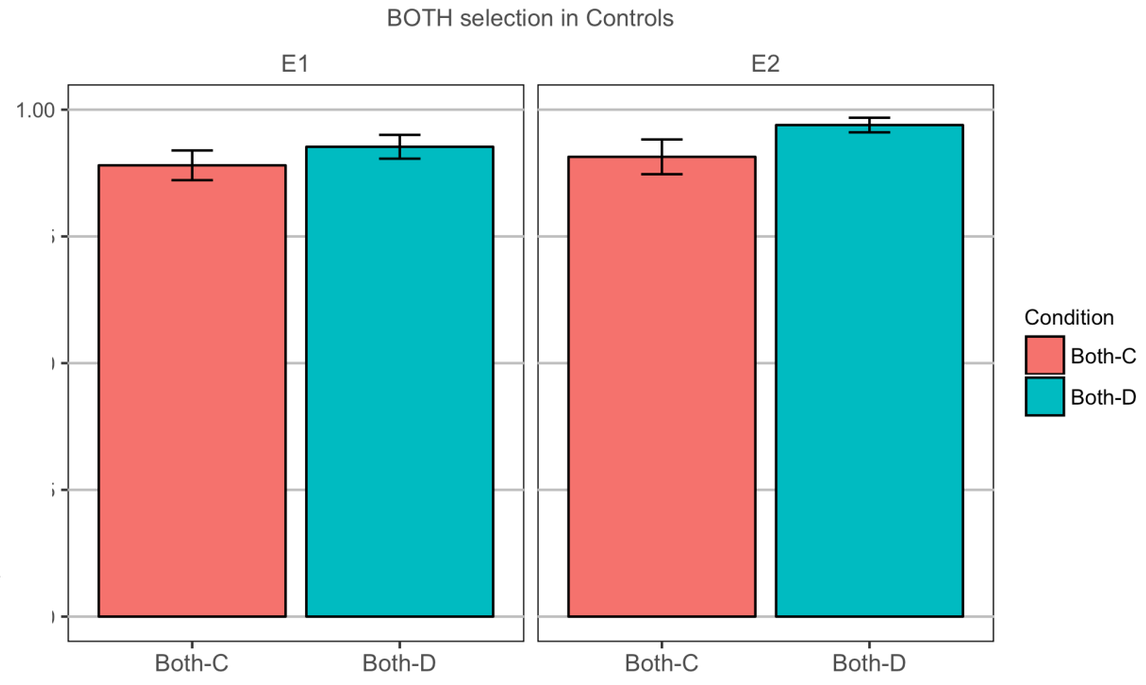
The cars are cheap.



Press D *Press K*

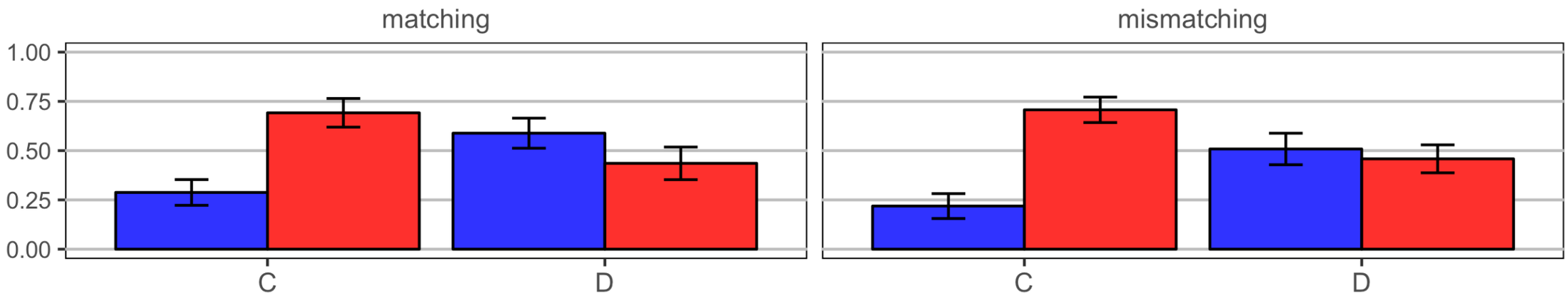
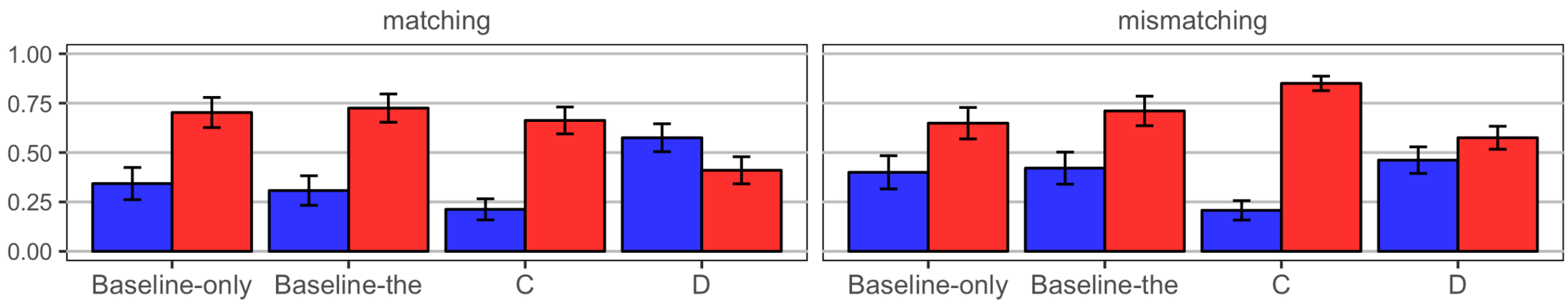
Experiments 1 and 2
Control trials: Results





Experiments 1 and 2
Matching vs. Mismatching predicate dimensions

Experiment 1



Experiment 2