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ARTICLE INFO

ABSTRACT

1. Introduction

2. The elements of SDT

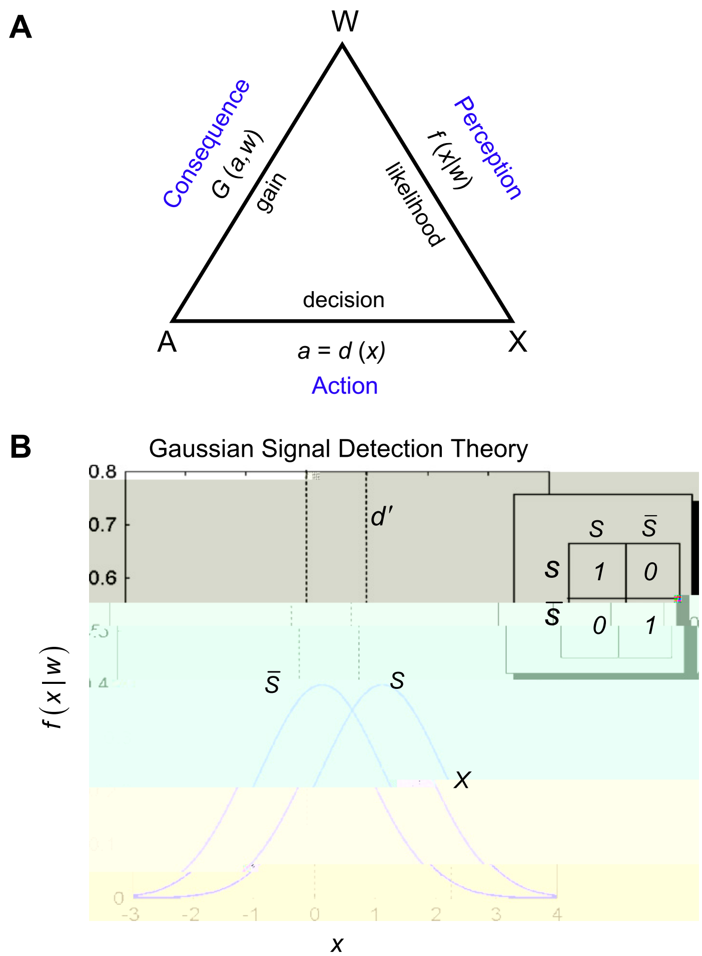

A
W
Consequence
G (a,w)
gain
Perception
f (x|w)
likelihood
decision
A
X
a = d (x)
Action
B
Gaussian Signal Detection Theory
0.8
0.7
0.6
d′
s
s̄
1
0
0
1
f (x | w)
s̄
s
X
0
-3
-2
-1
0
1
2
3
4
x

Fig. 1.

$$EG[\ |\ ] = \int_{-\infty}^{\infty} G(\ (\ ),\ )\ (\ |\ ) \quad (\ )$$

$$EG[\ |\ ] = \int_{-\infty}^{\infty} G(\ (\ ),\ )\ (\ |\ ) = [\ (\ ) = \ ]$$

$$EG[\ |\bar{}\ ] = \int_{-\infty}^{\infty} G(\ (\ ),\bar{}\ )\ (\ |\bar{}\ ) = [\ (\ ) = \bar{}\ ] \quad (\ )$$

$$EG[\ |\ ] = EG[\ |\ ] + (\ -\ )EG[\ |\ ] \quad (\ )$$

$$EG[\ |\bar{}\ ] = EG[\ |\bar{}\ ] + (\ -\ )EG[\ |\bar{}\ ] \quad (\ )$$

2.1. D

$$EG[\ |\ ] \geqslant EG[\ |\ ] \quad (\ )$$

2.2. M

2.3.

B

$BG(\ ) =$

2.4. u

2.5. u

G( ) G(¯,¯) = G(,¯) = G(¯,) =

3. Modeling biological perception and action

3.1. A u

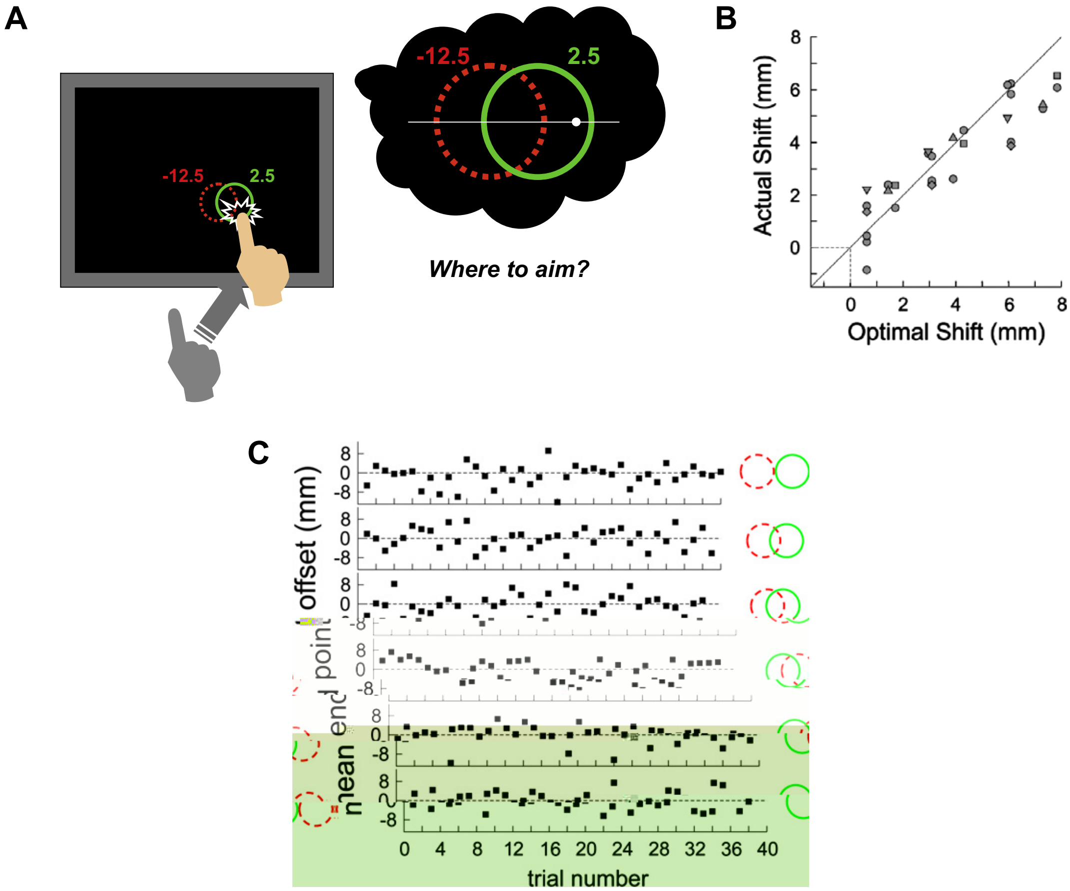


Fig. 3. *A* u

σ σ_M σ_L (σ_M) (σ_L) σ_∞ σ

3.2. C u

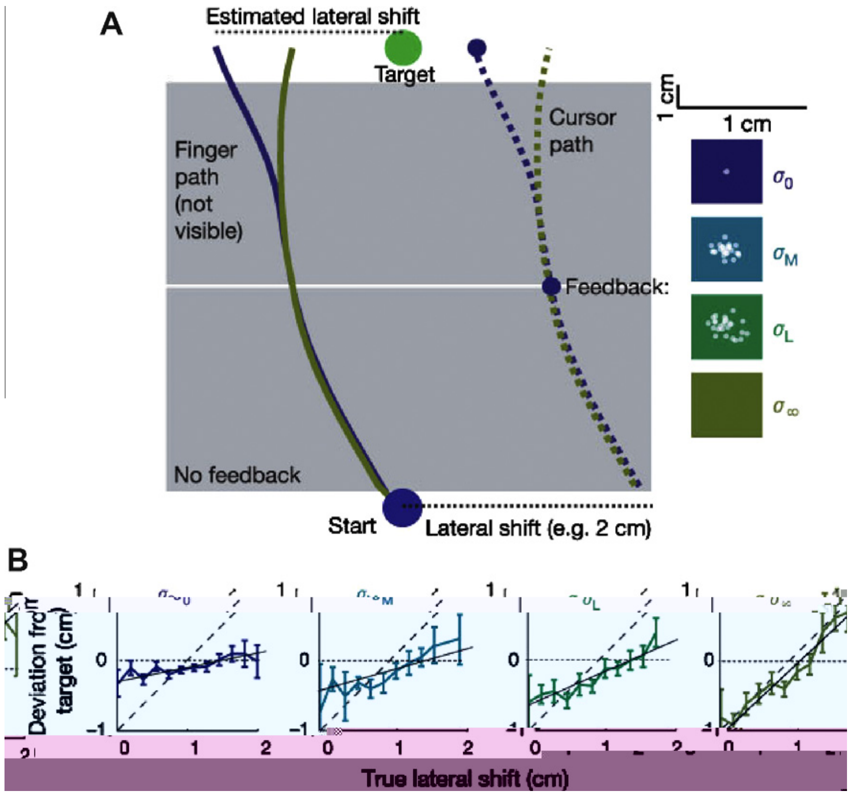

A
Estimated lateral shift
Target
Cursor path
Finger path (not visible)
Feedback:
No feedback
Start
Lateral shift (e.g. 2 cm)
1 cm
1 cm
σ_0
σ_M
σ_L
σ_∞
B
Deviation from target (cm)
True lateral shift (cm)

Fig. 4. C

3.3.

3.4. A u

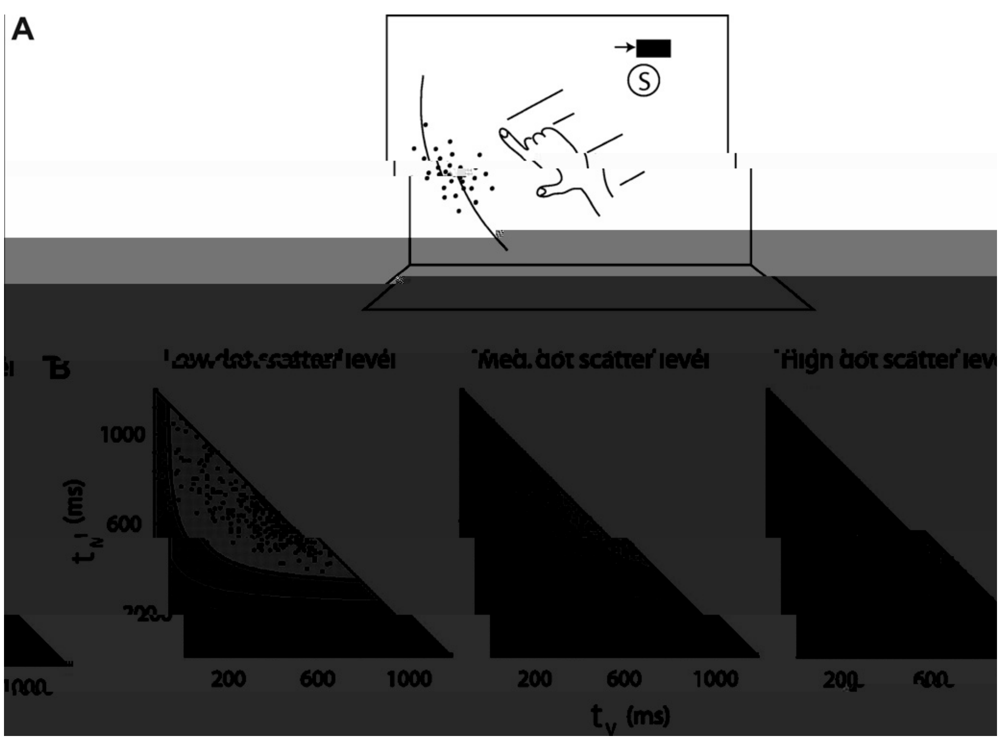

A
S
B
Low dot scatter level
Med. dot scatter level
High dot scatter lev
1000
600
200
t_N (ms)
t_V (ms)

Fig. 5. u . ( )

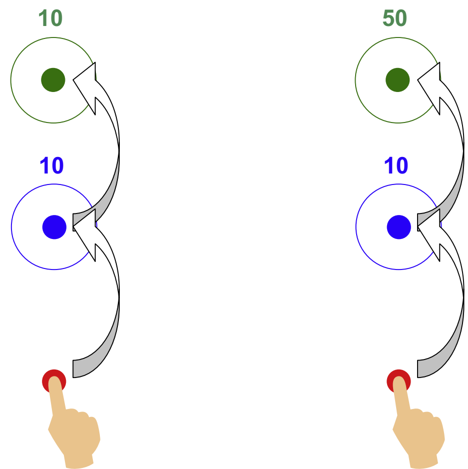
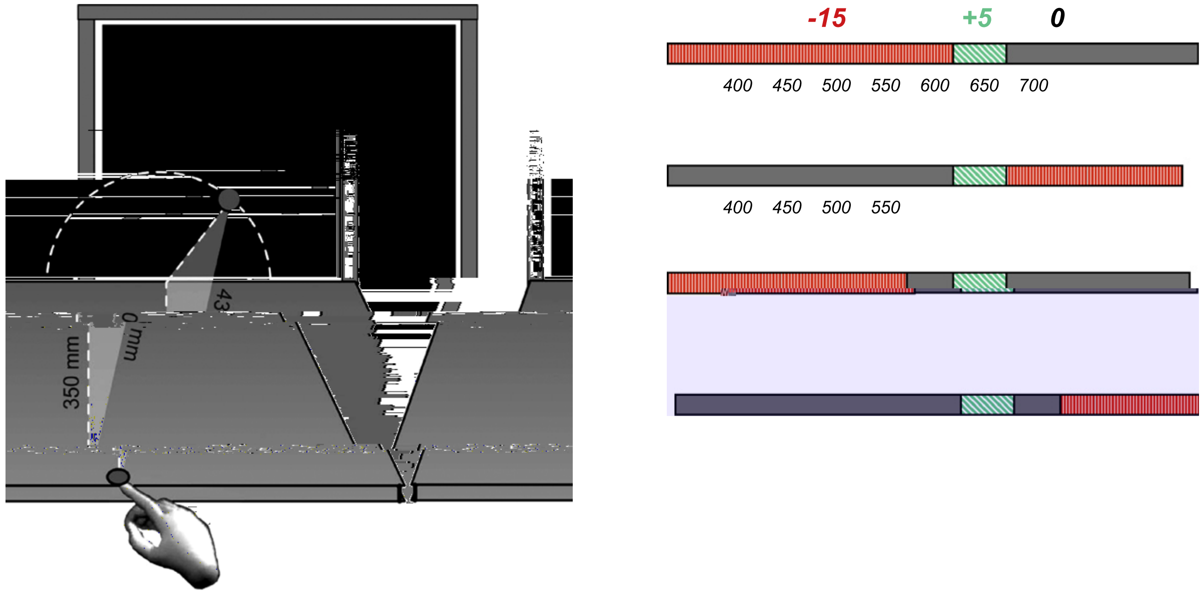


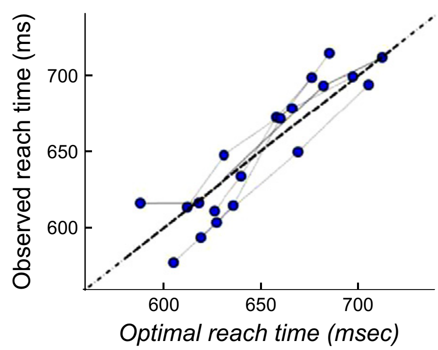
Fig. 6. *A u*

3.5. *u* *u*

4. Imperfectly optimal observers



-15
+5
0
400 450 500 550 600 650 700
400 450 500 550
350 mm
0 mm



Observed reach time (ms)
600
650
700
Optimal reach time (msec)

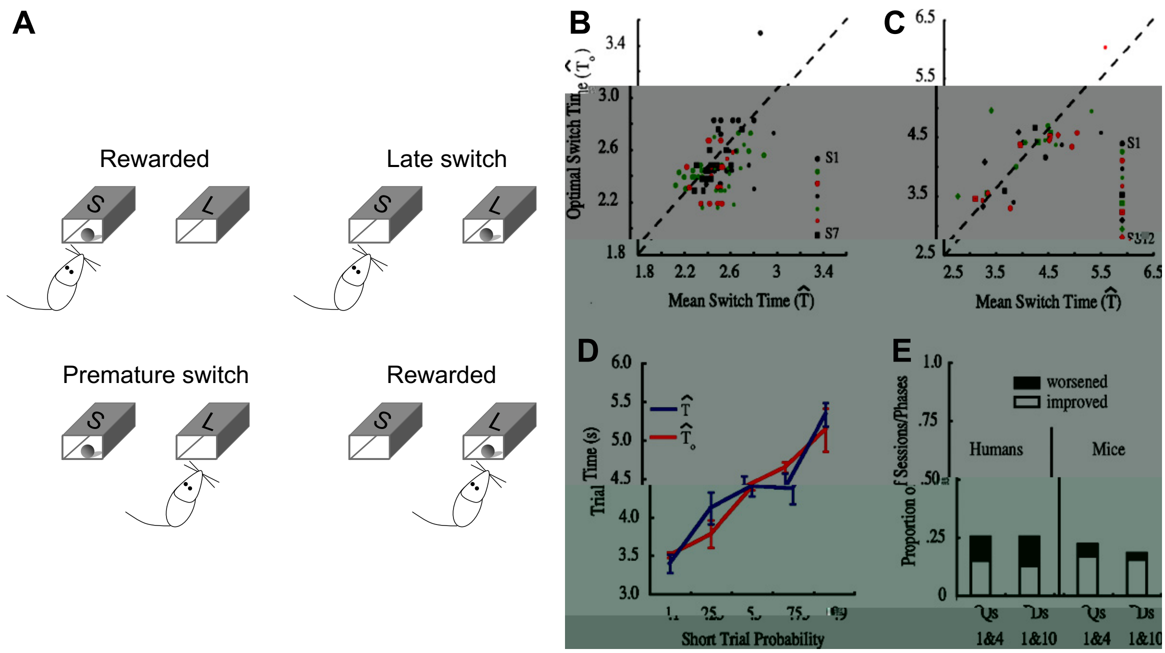


Fig. 8.

5. Testing the Bayesian hypothesis

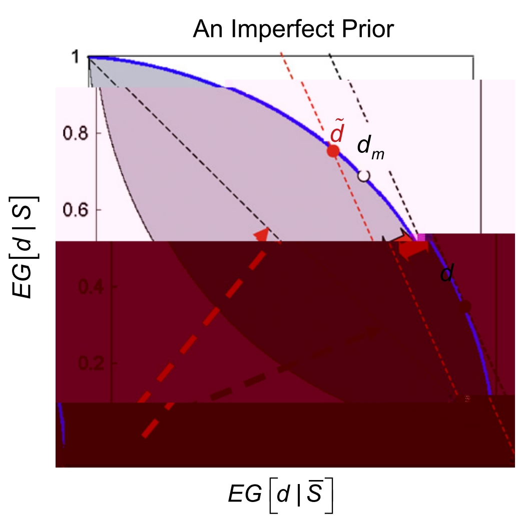


Fig. 9.

6. Conclusion

Acknowledgments

References