Univerzitet u Beogradu
Filozofski fakultet
Odeljenje za psihologiju

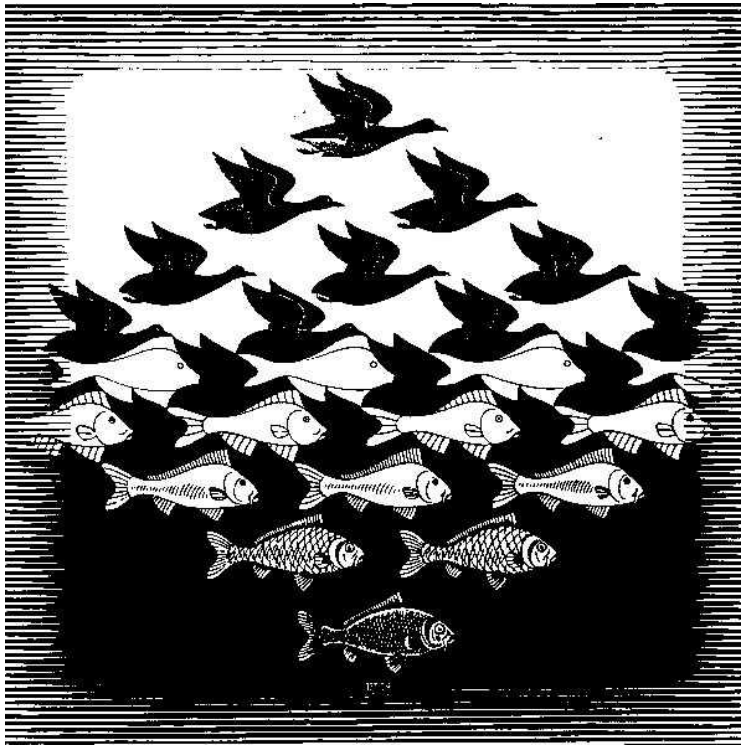
Slobodan Marković

PSIHOLOGIJA OPAŽANJA

Tematske celine

PSIHOFIZIKA
ČULA
PERCEPCIJA

FAKTORI PSIHOFIZIČKOG SUĐENJA



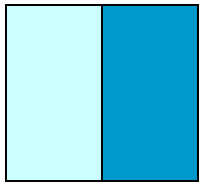
TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

OPŠTA METODOLOGIJA: Odluka SIGNAL (**S**) ili ŠUM (**N**)

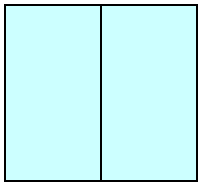
Békésy (1930): Razlika u jačini tona Standard – Varijabilna draž

St < Var

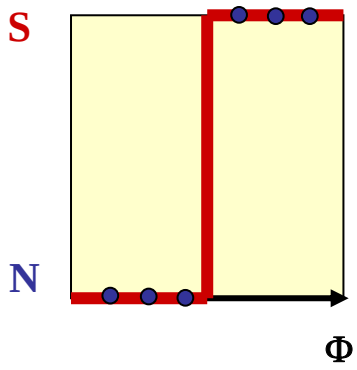


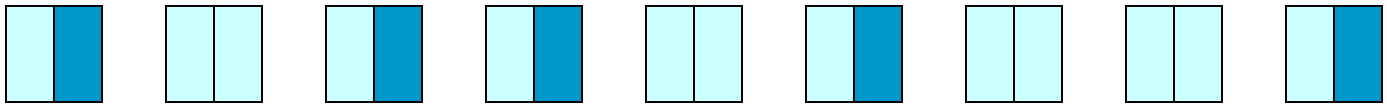
N S

St = Var



N N



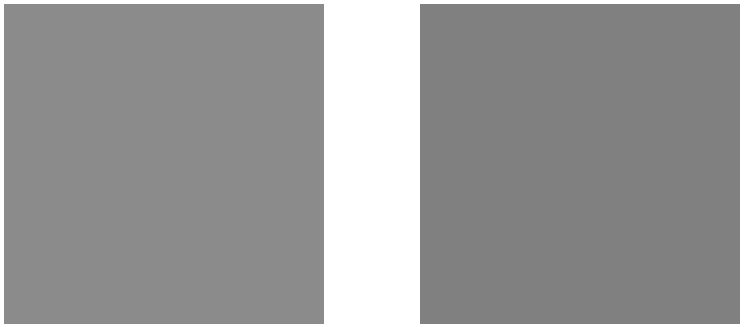


N S **N N** **N S** **N S** **N N** **N S** **N N** **N N** **N S**

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

OPŠTA METODOLOGIJA: Odluka SIGNAL (**S**) ili ŠUM (**N**)



S **N**

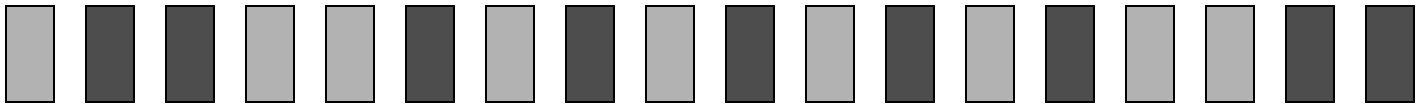
TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

OPŠTA METODOLOGIJA: Odluka SIGNAL (**S**) ili ŠUM (**N**)

1. Temporalno nizanje: stimulus je ili **S** ili **N**

a) Diskretni stimulusi



S N N S S N S N S N S N S N S S N N

b) Kontinuirana stimulacija

S NN S S N S N S N S N S N S S N N S N S S N S N S N N

TEORIJA DETEKCIJE SIGNALA

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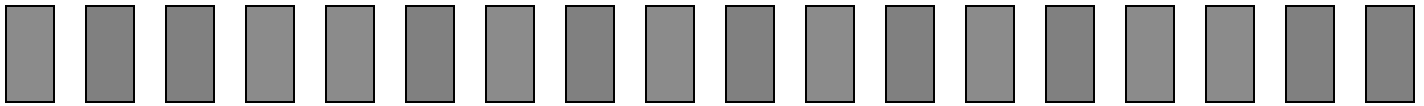


S N N S S N S N S N S N S N S S N N

b) Kontinuirana stimulacija

S NN S S N S N S N S N S N S S N N S N S S N S N S N N

TEORIJA DETEKCIJE SIGNALA

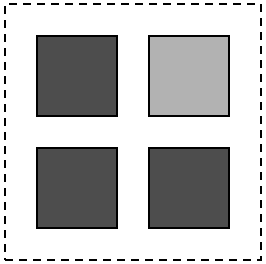
Tanner, Swets & Green (1953-1966)

OPŠTA METODOLOGIJA: Odluka SIGNAL (**S**) ili ŠUM (**N**)

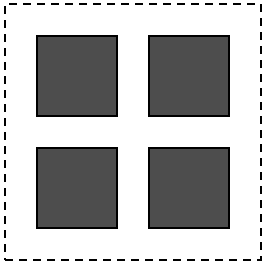
1. Spacijalna distribucija: stimulus sadrži ili samo **N** ili **N** + **S**

a) Diskretni stimulusi

N + **S**

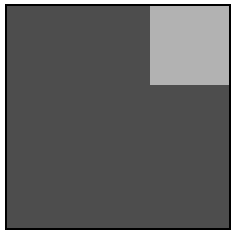


N

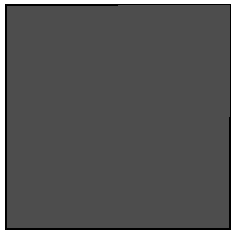


b) Kontinuirana stimulacija

N + **S**



N



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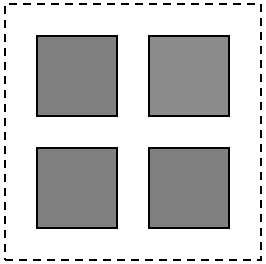
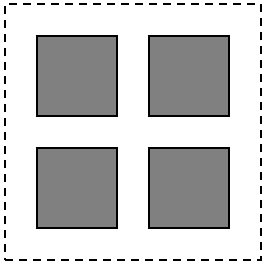
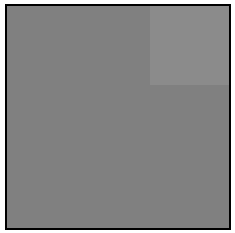


N

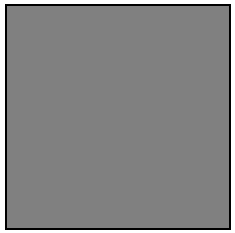


b) Kontinuirana stimulacija

N + **S**

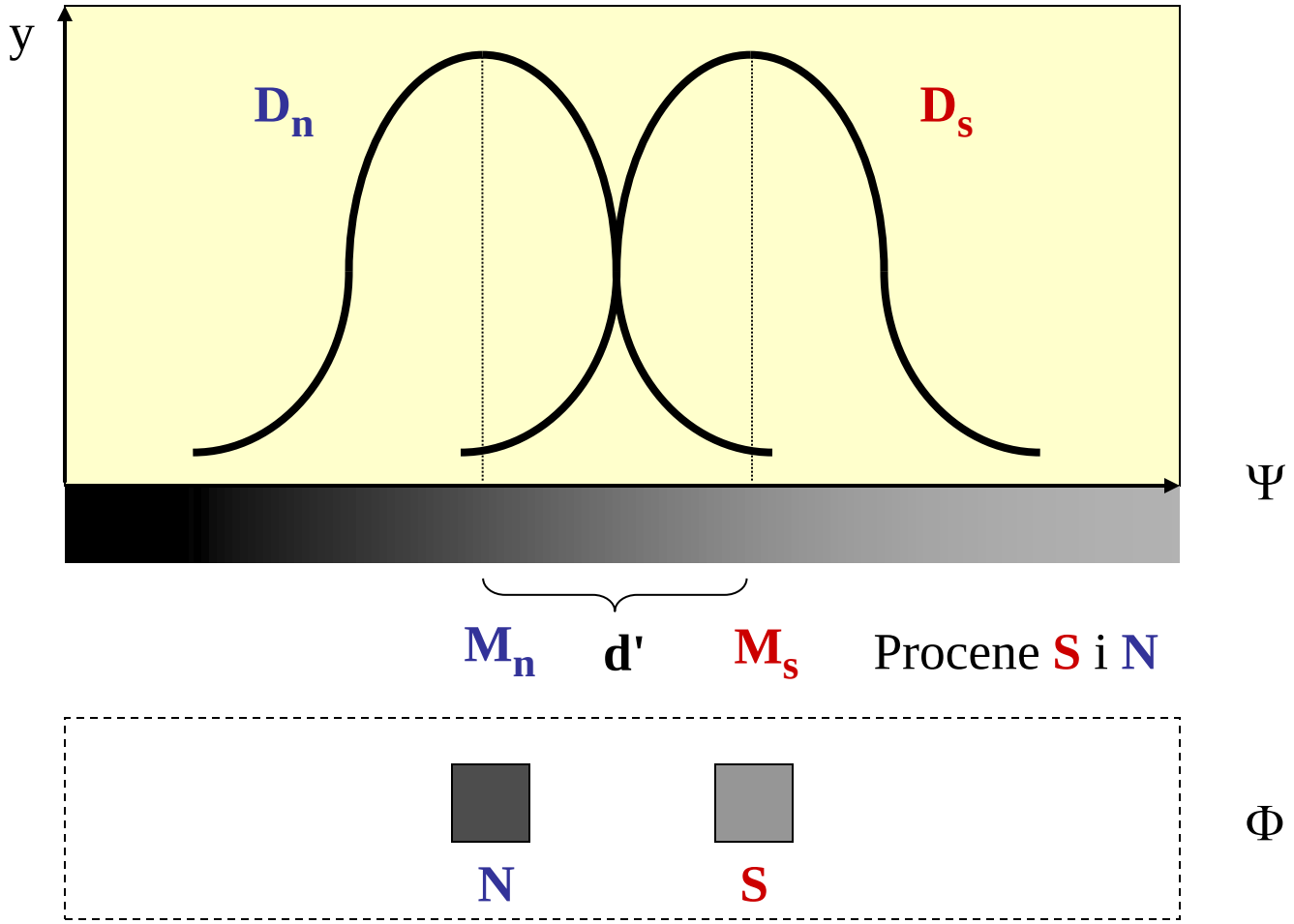


N



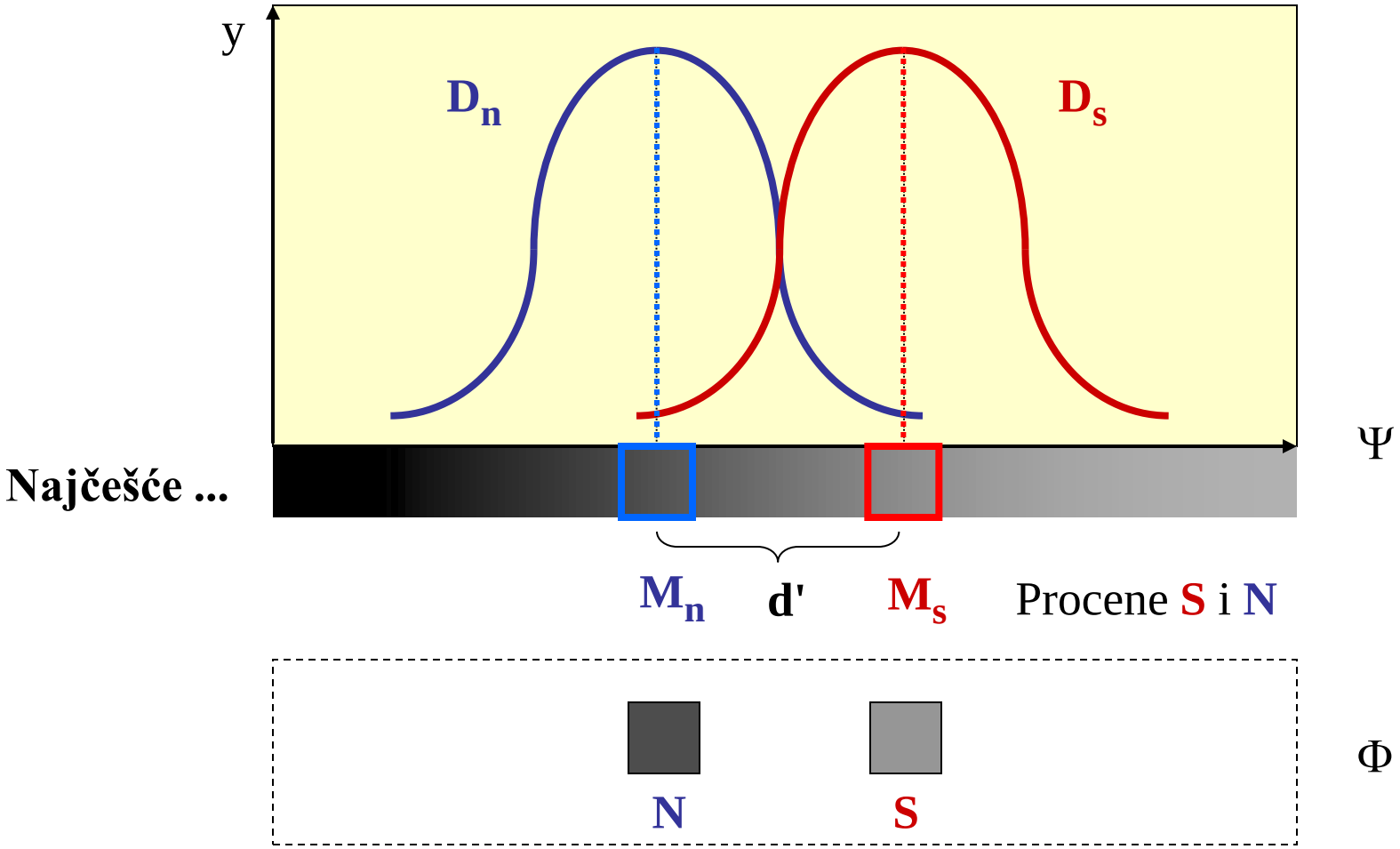
TEORIJA DETEKCIJE SIGNALA

SENZORNA DISKRIMINACIJA: SIGNAL (**S**) – ŠUM (**N**)



TEORIJA DETEKCIJE SIGNALA

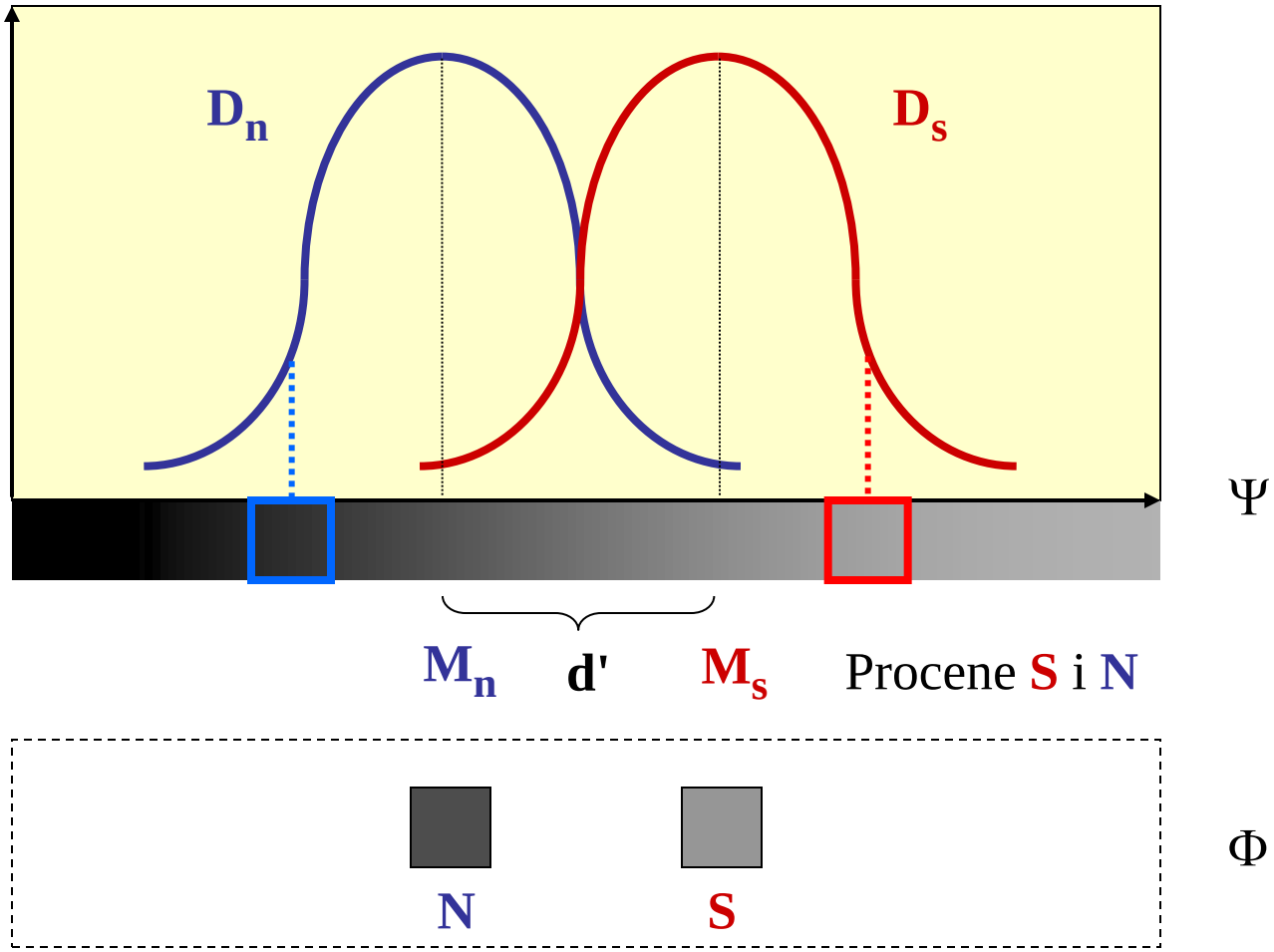
SENZORNA DISKRIMINACIJA: SIGNAL (**S**) – ŠUM (**N**)



TEORIJA DETEKCIJE SIGNALA

SENZORNA DISKRIMINACIJA: SIGNAL (**S**) – ŠUM (**N**)

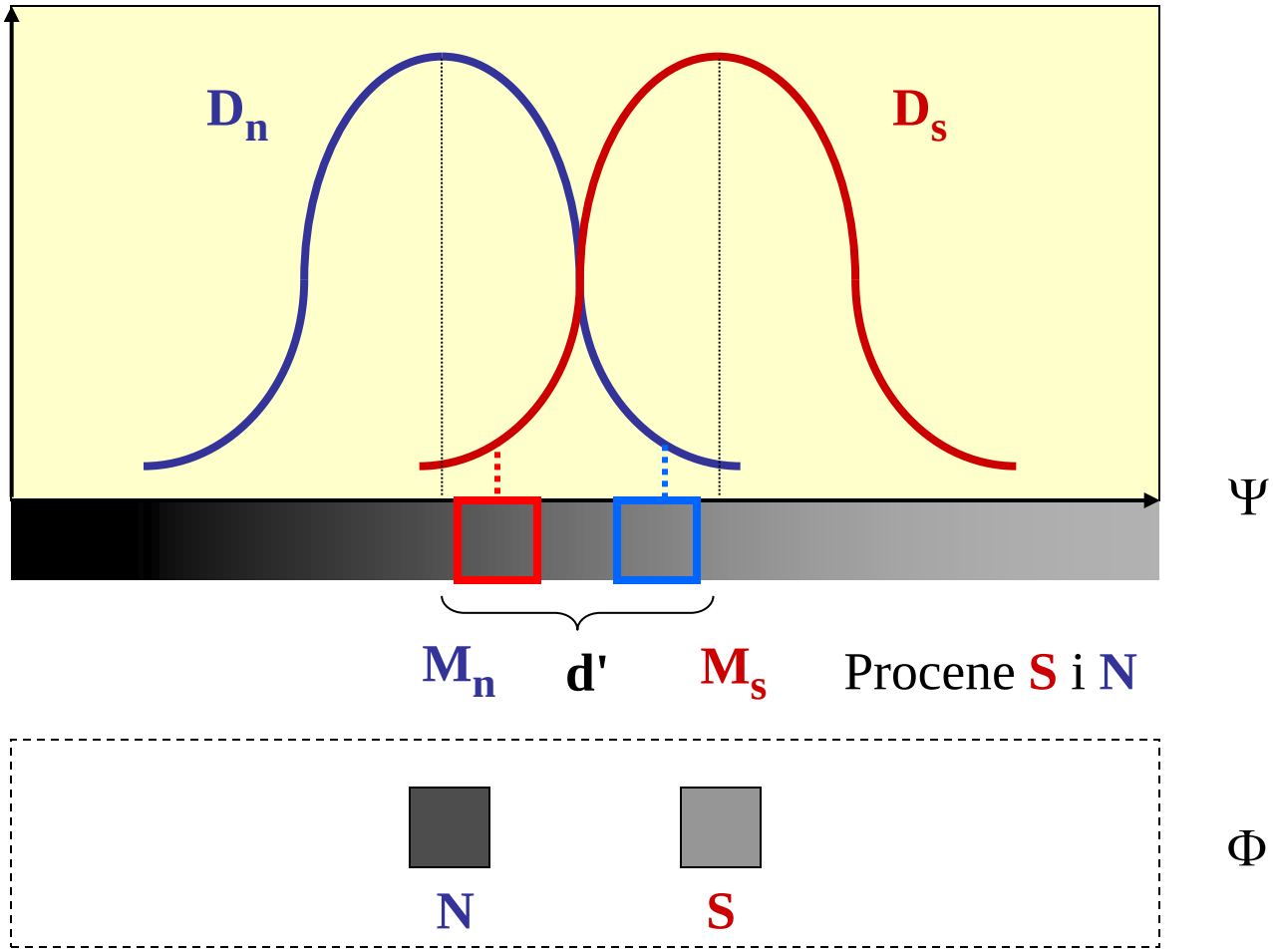
Retko ...



TEORIJA DETEKCIJE SIGNALA

SENZORNA DISKRIMINACIJA: SIGNAL (**S**) – ŠUM (**N**)

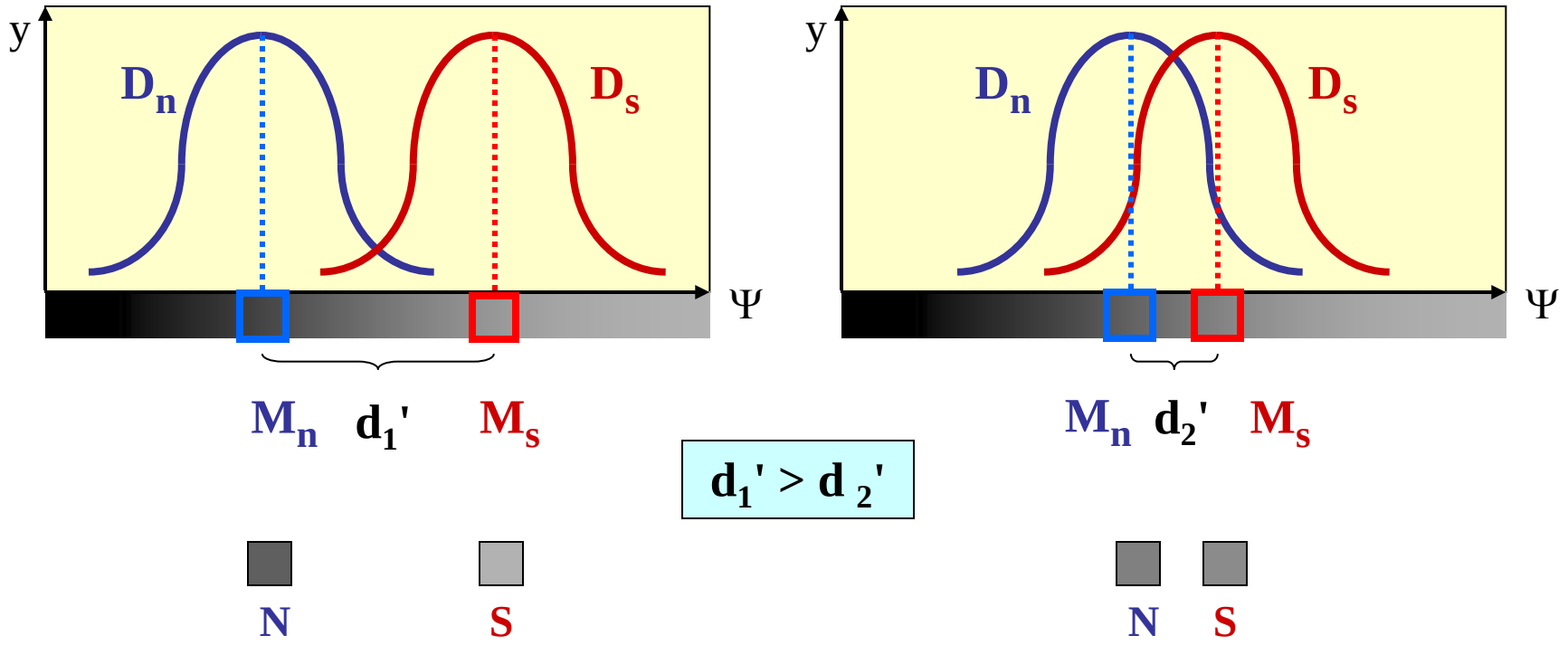
Veoma retko ...



TEORIJA DETEKCIJE SIGNALA

SENZORNA DISKRIMINACIJA: SIGNAL (**S**) – ŠUM (**N**)

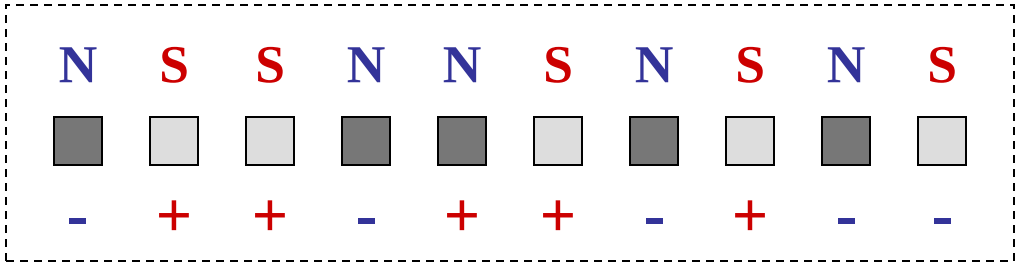
Indikator osetljivosti: **d'** (**Ms** – **Mn**)



TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)



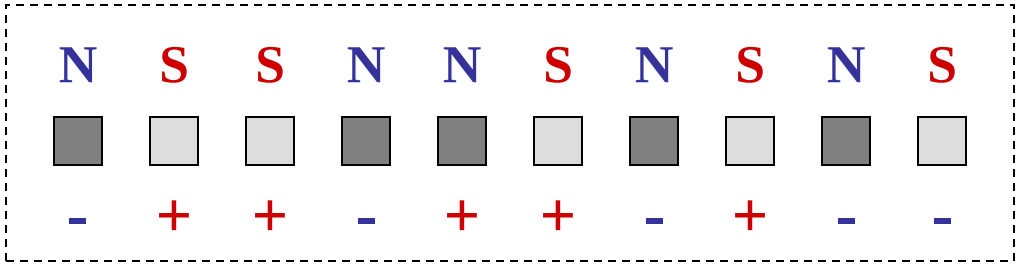
	S	**N**	
+	p (+ / **S**)	p (+ / **N**)	Lažne uzbune!
-	p (- / **S**)	p (- / **N**)	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)



	S	**N**	
+	p = **4** / **5** = **0,8**	p = **1** / **5** = **0,2**	Lažne uzbune!
-	p = **1** / **5** = **0,2**	p = **4** / **5** = **0,8**	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Idealna detekcija

Bez grešaka!

	S	**N**	
+	p (+ / **S**) = **1**	p (+ / **N**) = **0**	Lažne uzbune!
-	p (- / **S**) = **0**	p (- / **N**) = **1**	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Optimalni kriterijum

Što manje grešaka
Ravnomerno raspoređene greške

	S	**N**	
+	p (+ / **S**) = **0,8**	p (+ / **N**) = **0,2**	Lažne uzbune!
-	p (- / **S**) = **0,2**	p (- / **N**) = **0,8**	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

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	S	**N**	
+	p (+ / **S**) = **0,8**	p (+ / **N**) = **0,2**	Lažne uzbune!
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Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Strog kriterijum: više - nego +

MOTIVACIJA

Kazna za lažne uzbune ili
nagrada za korektno odbacivanje

	S	**N**	
+	p (+ / **S**) = **0,8**	p (+ / **N**) = **0,2**	Lažne uzbune!
-	p (- / **S**) = **0,2**	p (- / **N**) = **0,8**	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Strog kriterijum: više - nego +

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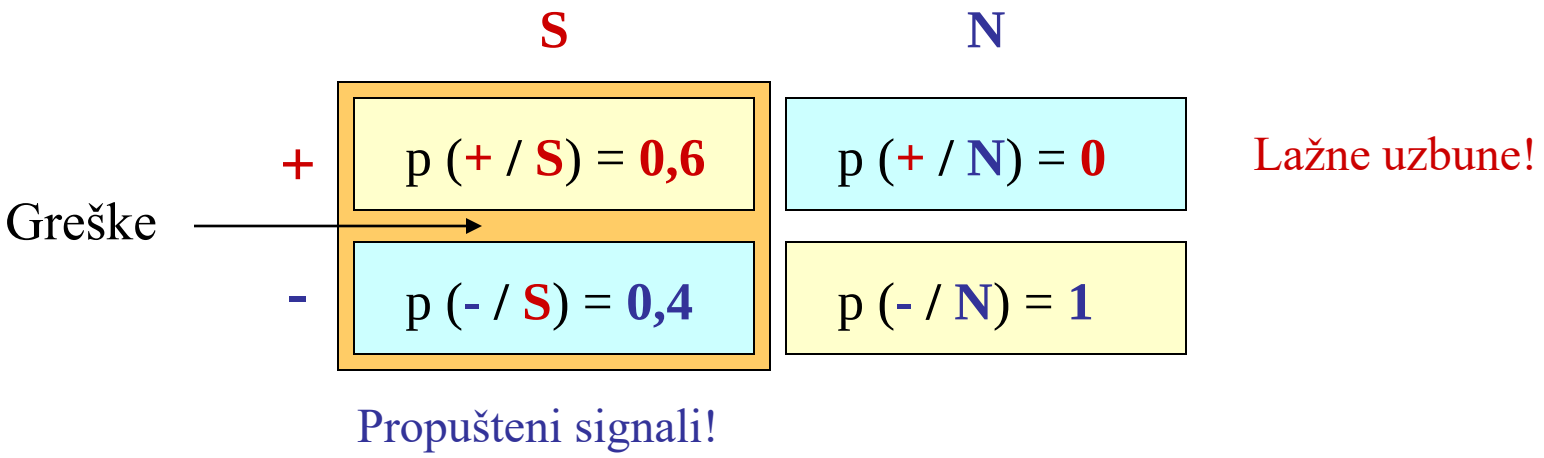

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Blag kriterijum: više + nego -

MOTIVACIJA

Nagrada za ispravnu detekciju signala ili kazna za propuštene signale

	S	**N**	
+	p (+ / **S**) =	p (+ / **N**) =	Lažne uzbune!
-	p (- / **S**) =	p (- / **N**) =	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Blag kriterijum: više + nego -

MOTIVACIJA

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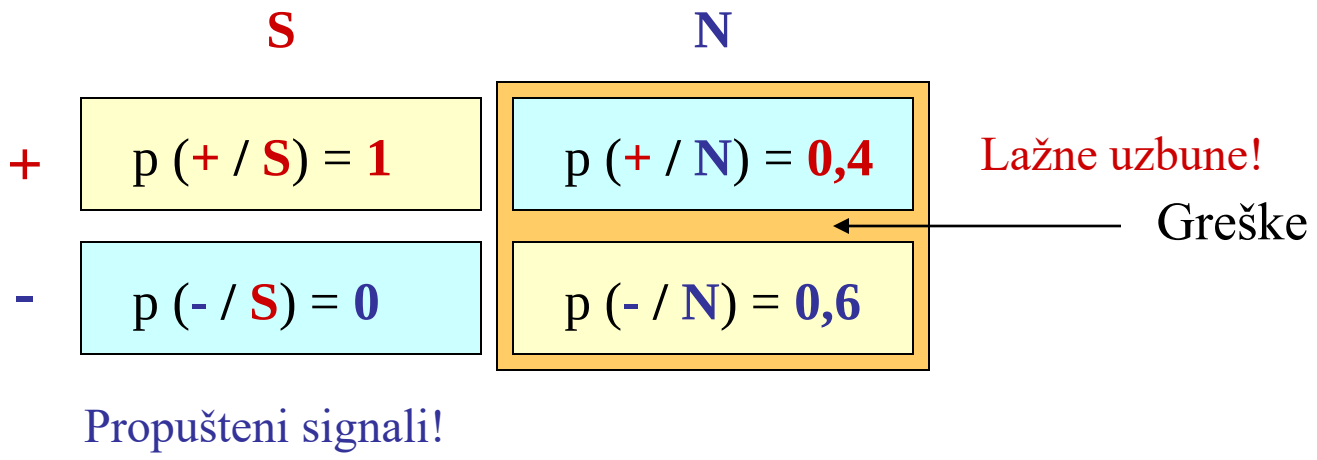


TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

"Strog" kriterijum: više - nego +

OČEKIVANJE

Subjekt zna da će se N pojavljivati češće od S

	S	**N**	
+	p (+ / **S**) = **0,6**	p (+ / **N**) = **0**	Lažne uzbune!
-	p (- / **S**) = **0,4**	p (- / **N**) = **1**	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

"Blag" kriterijum: više + nego -

OČEKIVANJE

Subjekt zna da će se
S pojavljivati češće od N

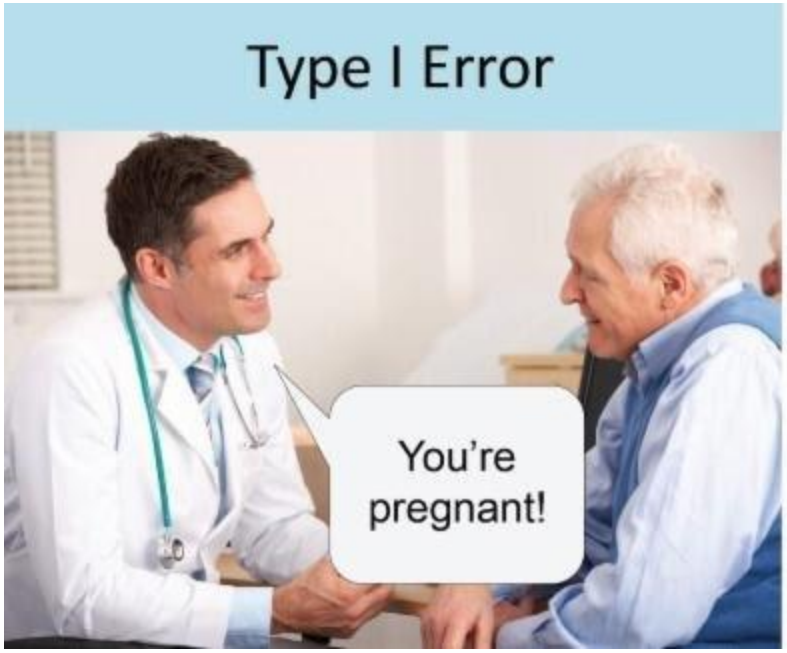
	S	**N**	
+	p (+ / **S**) = **1**	p (+ / **N**) = **0,4**	Lažne uzbune!
-	p (- / **S**) = **0**	p (- / **N**) = **0,6**	

Propušteni signali!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL **(S)** – ŠUM **(N)**

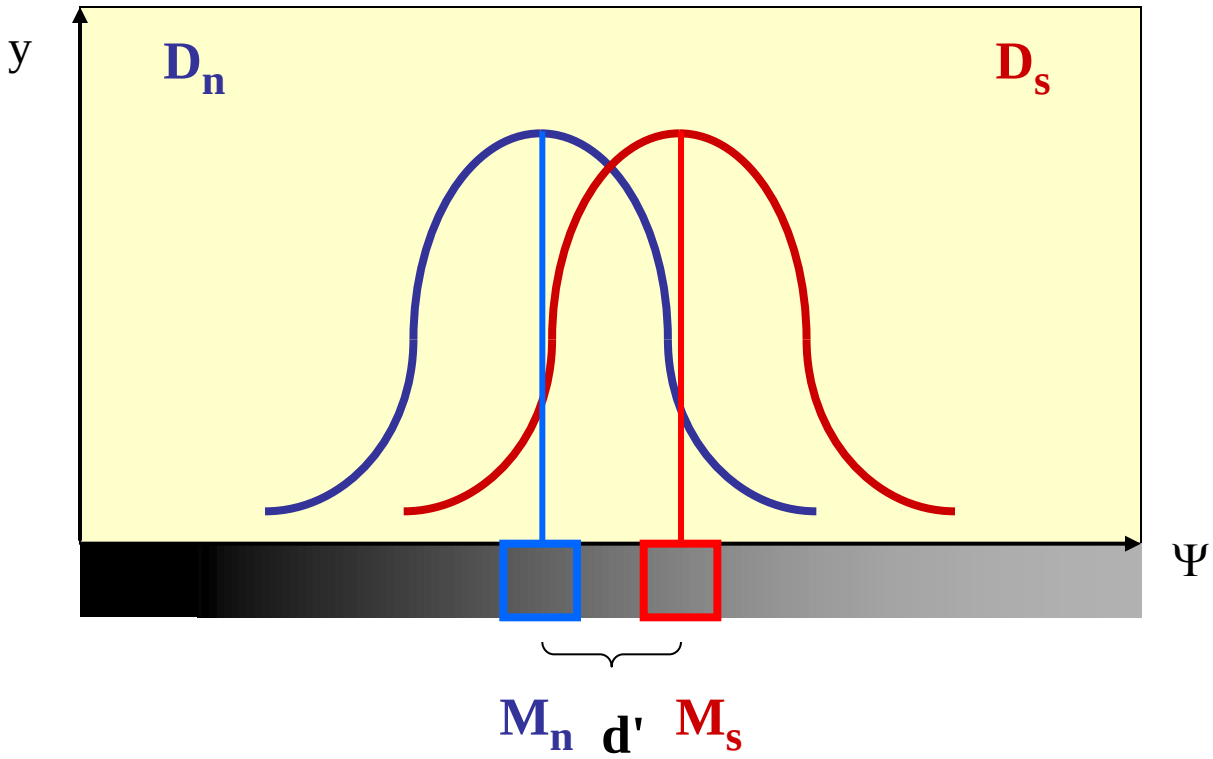


TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Indikator strategije: $\beta = y_s/y_n$



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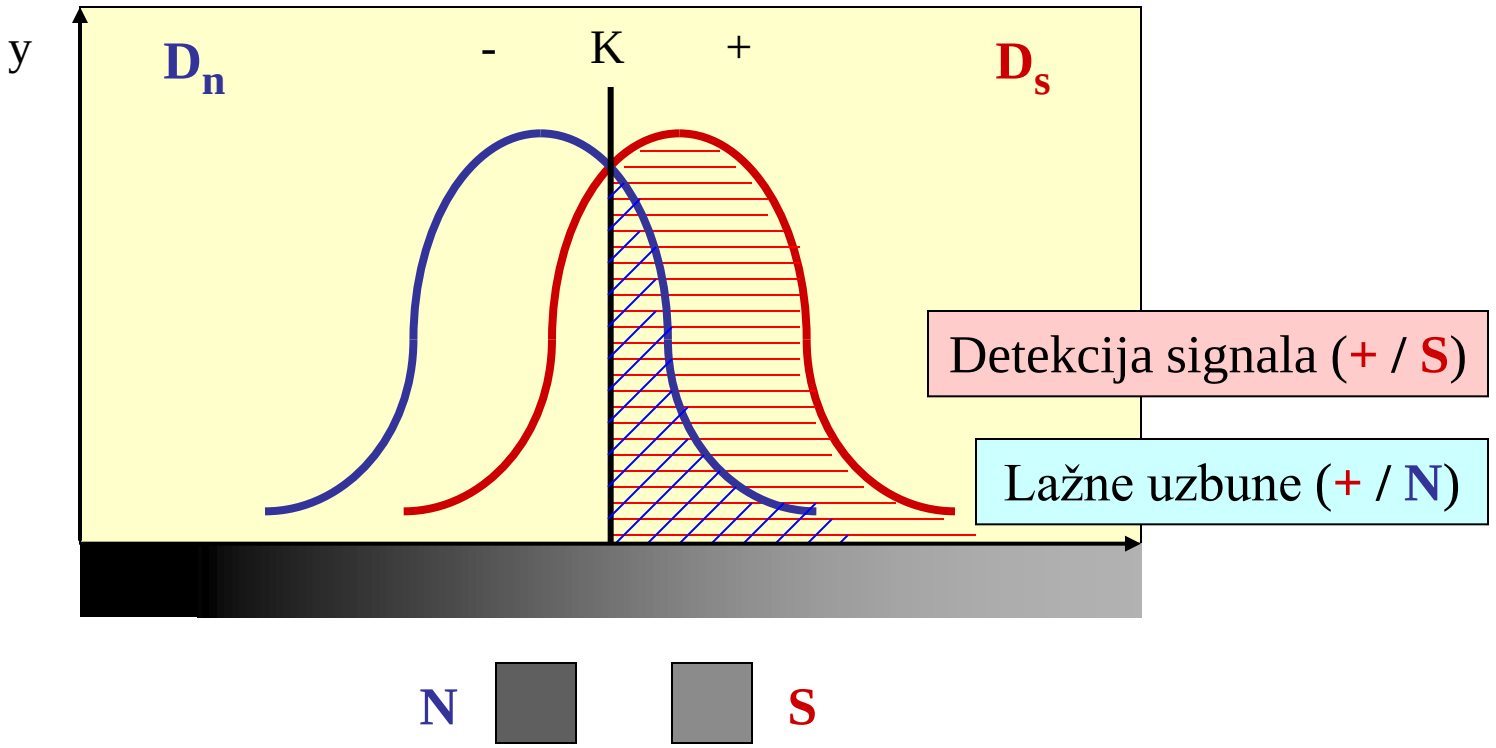

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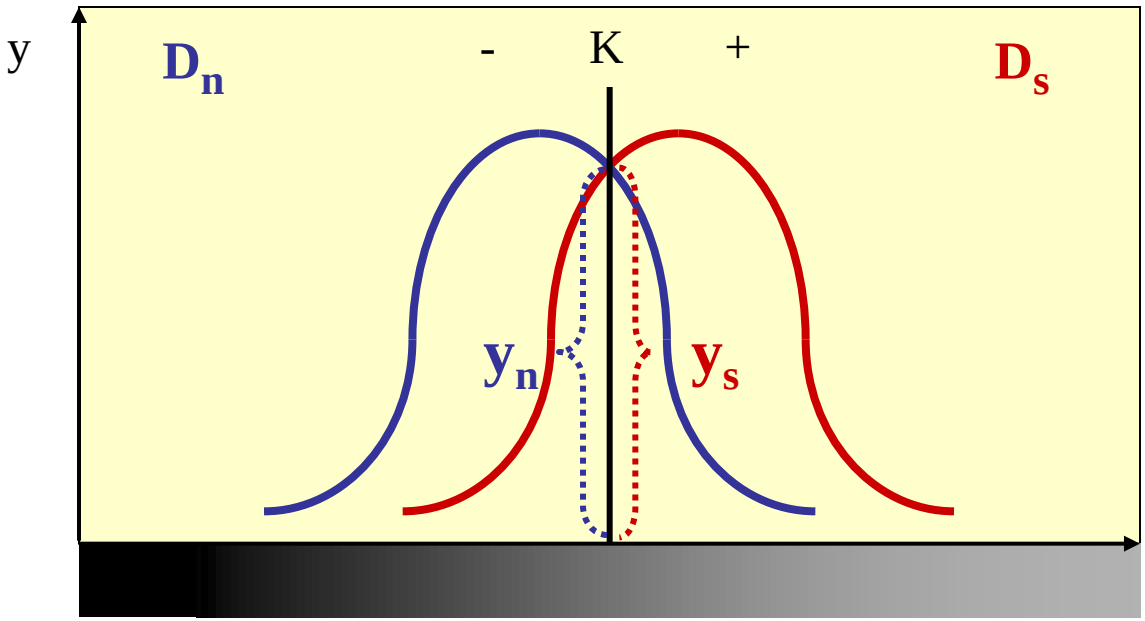


$\beta = 1$

Optimalan kriterijum!

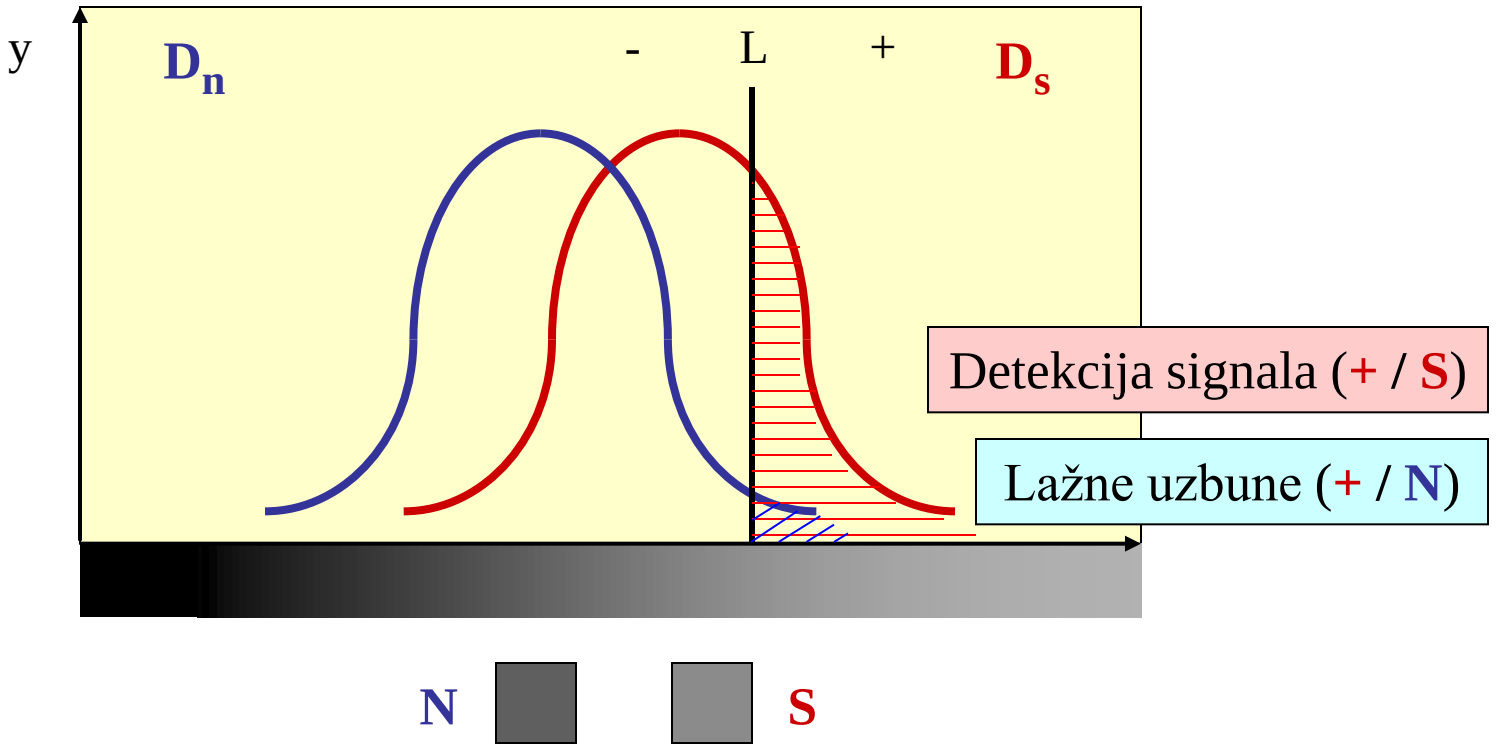
N **S**

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Indikator strategije: $\beta = y_s/y_n$

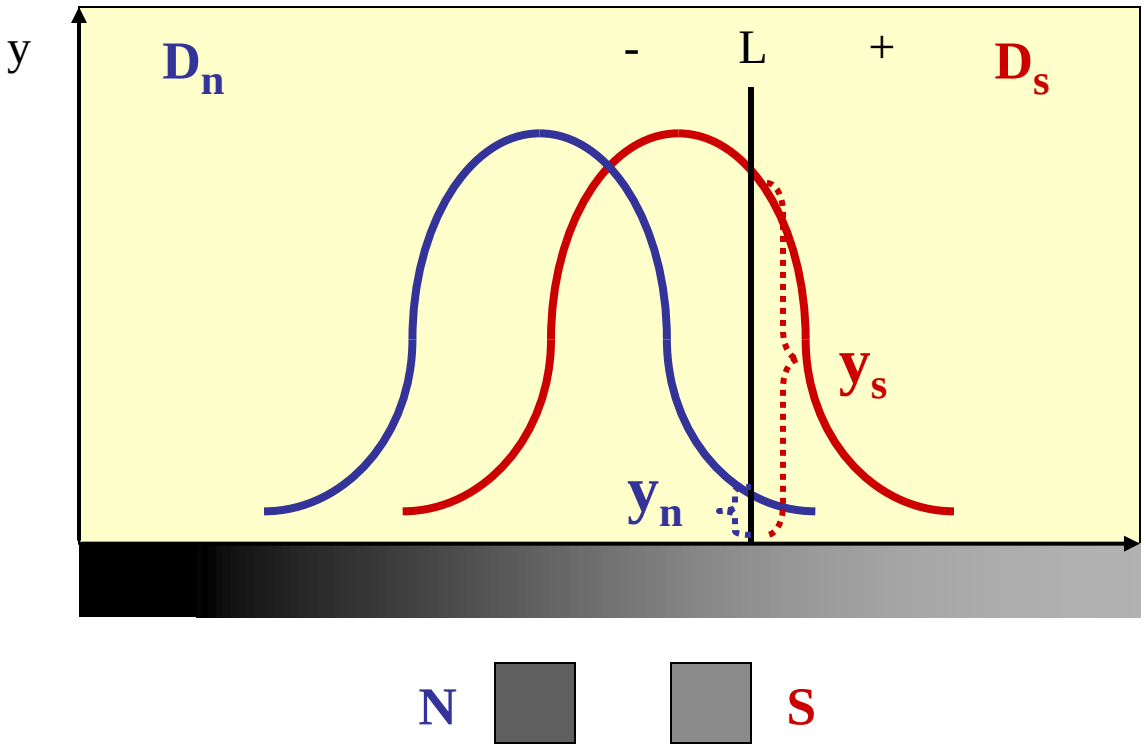


TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Indikator strategije: $\beta = y_s/y_n$



$\beta > 1$

Strog kriterijum!

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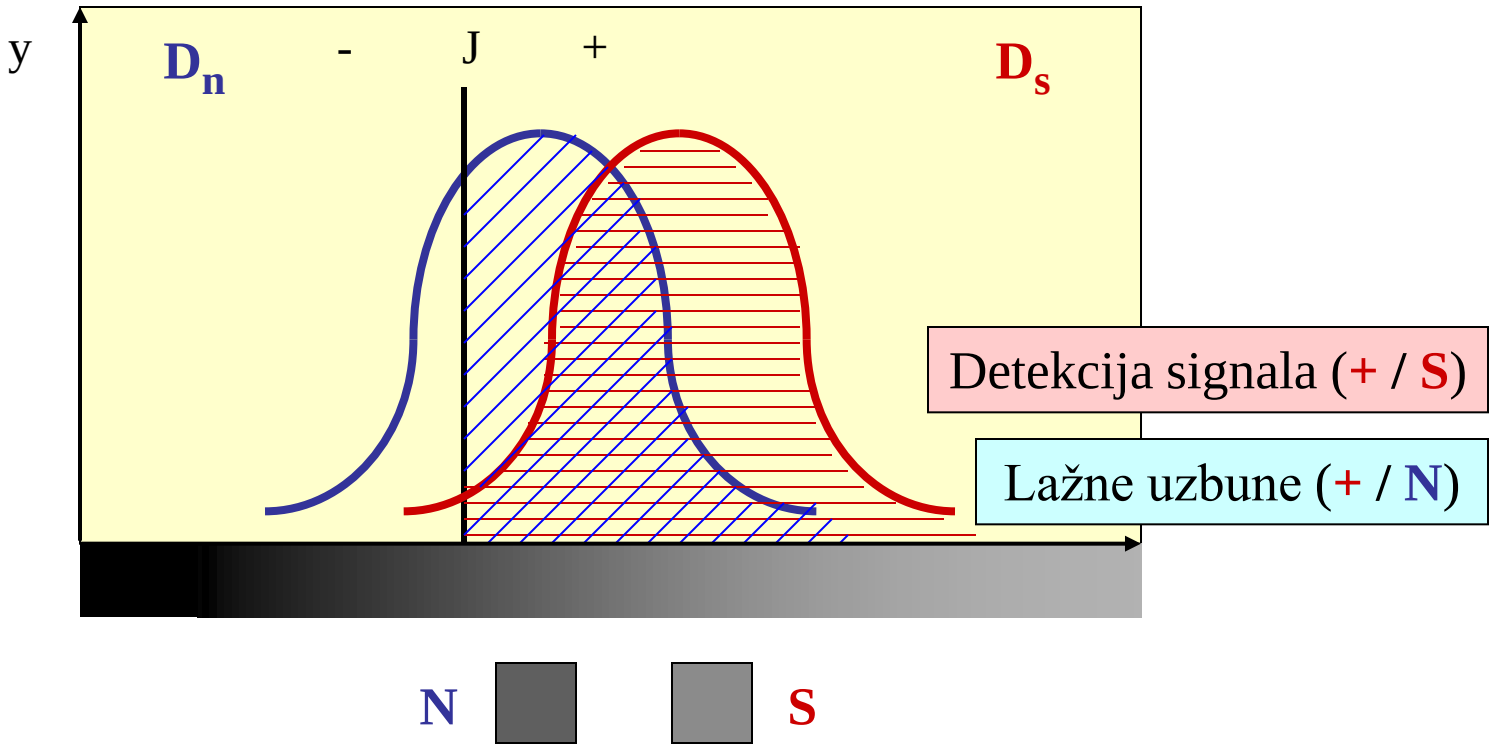
STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Indikator strategije: $\beta = y_s/y_n$



TEORIJA DETEKCIJE SIGNALA

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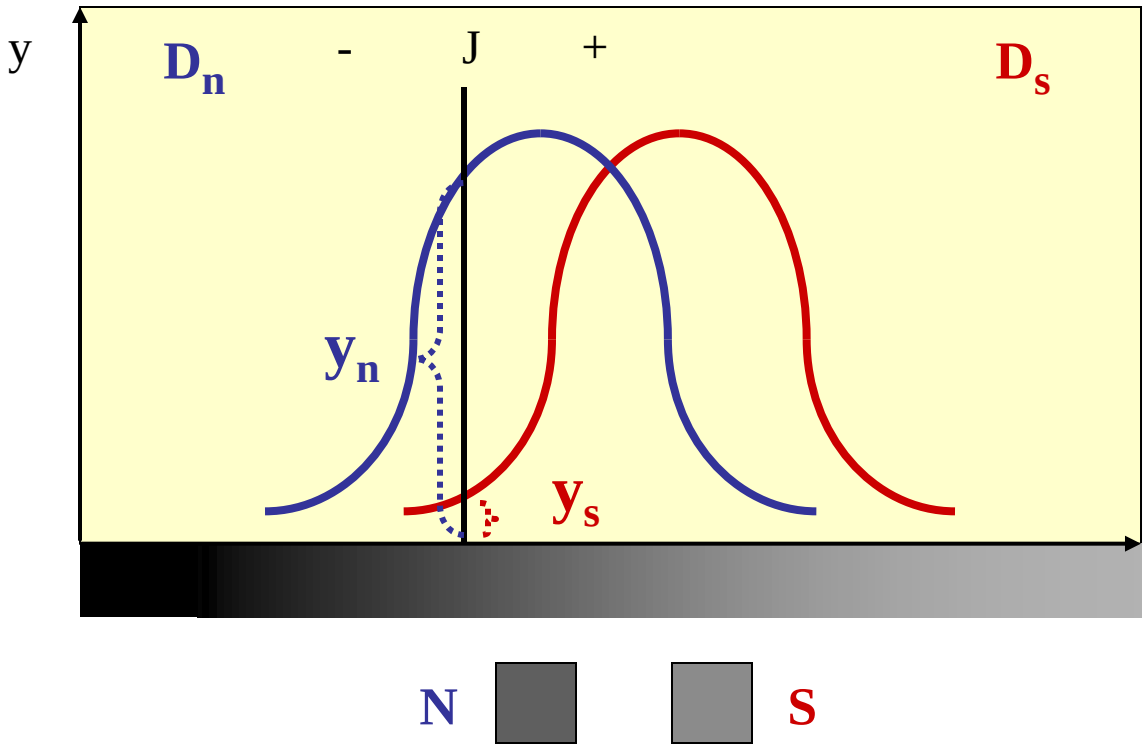


$\beta < 1$

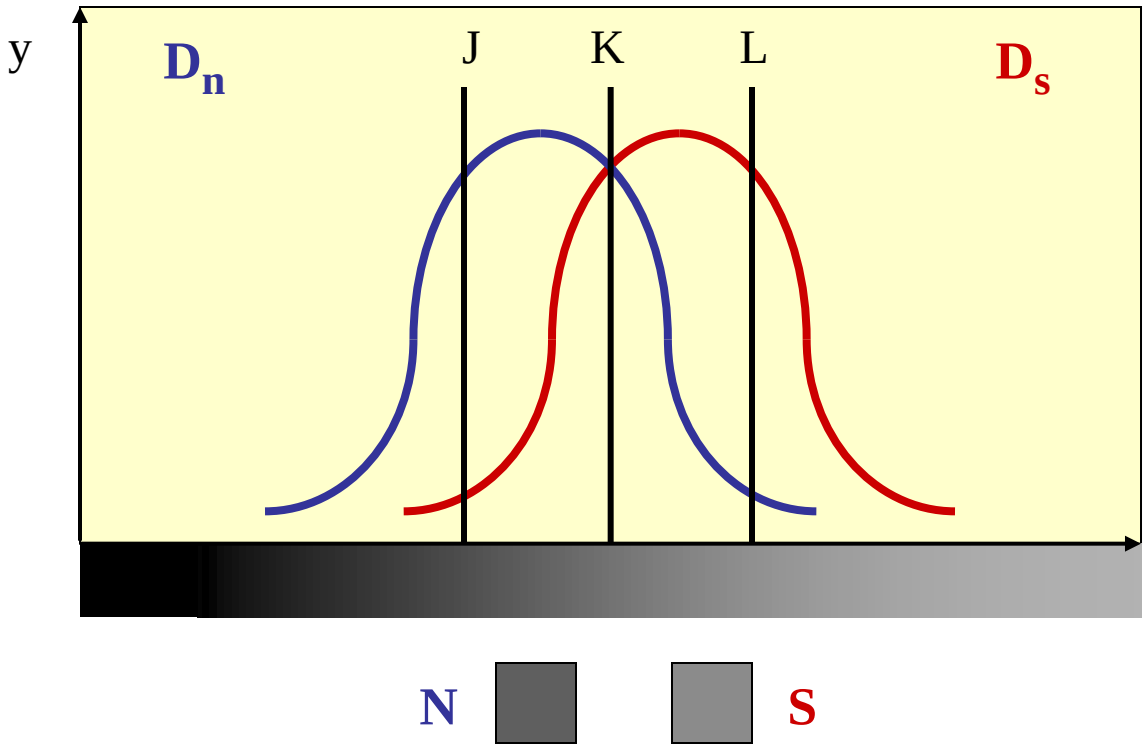
Blag kriterijum!

TEORIJA DETEKCIJE SIGNALA

Tanner, Swets & Green (1953-1966)

STRATEGIJA ODLUKE: SIGNAL (**S**) – ŠUM (**N**)

Indikator strategije: $\beta = y_s/y_n$



TEORIJA INFORMACIJE

Shannon & Weaver (1949)

Merenje količine informacije (KOLIKO?), a ne sadržaja (ŠTA?)

INFORMACIJA: Saopštenje o događaju X ili stanju X nekog sistema

KOLIČINA INFORMACIJE (h) koju nosi događaj X je neizvesnost X

KOLIČINA INFORMACIJE (h) zavisi od
broja mogućih događaja (N) i njihove verovatnoće (p)

$$h = f(N, p)$$

TEORIJA INFORMACIJE

Shannon & Weaver (1949)

$$h = f(N, p)$$

N Ukupan broj događaja

$N = \Sigma X$

$N = 2^h$ $\quad N = 2$

$h = \log_2 N$ $\quad h = 1$ 1 bit

p Verovatnoća događaja

$p = 1/N$

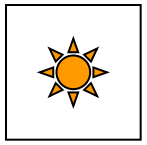
$h = \log_2 1/N$

$h = - \log_2 p$

TEORIJA INFORMACIJE

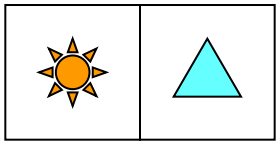
N = 1

p = 1



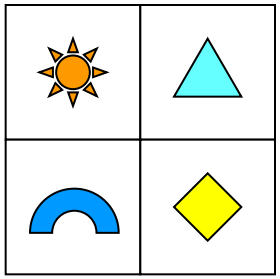
N = 2

p = .500



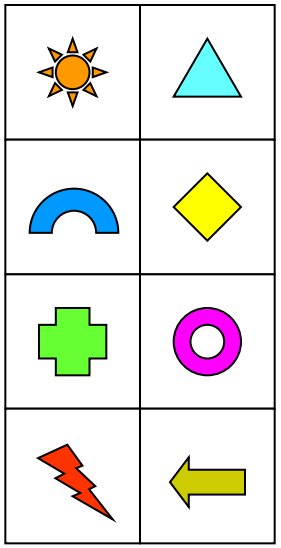
N = 4

p = .250



N = 8

p = .125



$h = \log_2 1$

$h = -\log_2 1{,}0$

h = 0

$h = \log_2 2$

$h = -\log_2 .500$

h = 1

$h = \log_2 4$

$h = -\log_2 .250$

h = 2

$h = \log_2 8$

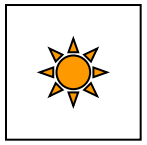
$h = -\log_2 .125$

h = 3

TEORIJA INFORMACIJE

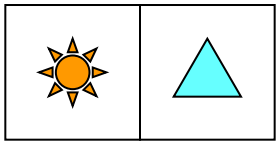
N = 1

p = 1



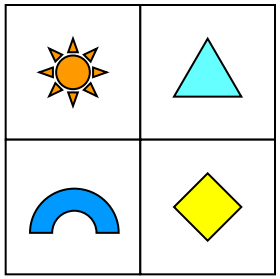
N = 2

p = .500



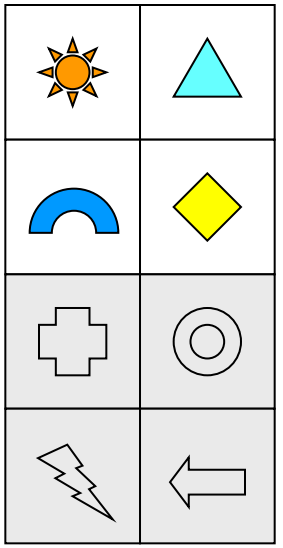
N = 4

p = .250



N = 8

p = .125



1

$h = \log_2 1$

$h = -\log_2 1{,}0$

h = 0

$h = \log_2 2$

$h = -\log_2 .500$

h = 1

$h = \log_2 4$

$h = -\log_2 .250$

h = 2

$h = \log_2 8$

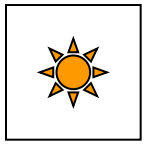
$h = -\log_2 .125$

h = 3

TEORIJA INFORMACIJE

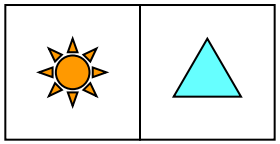
N = 1

p = 1



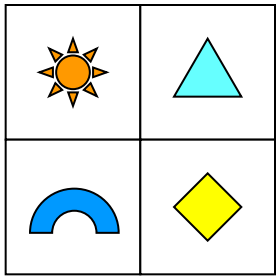
N = 2

p = .500



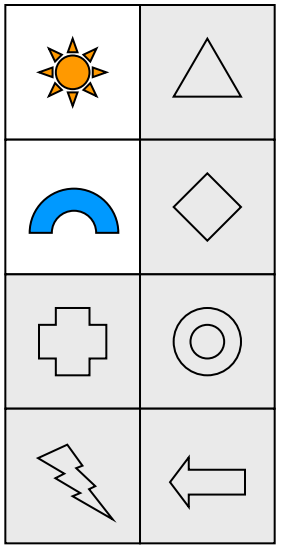
N = 4

p = .250



N = 8

p = .125



2

1

$h = \log_2 1$

$h = -\log_2 1{,}0$

h = 0

$h = \log_2 2$

$h = -\log_2 .500$

h = 1

$h = \log_2 4$

$h = -\log_2 .250$

h = 2

$h = \log_2 8$

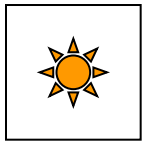
$h = -\log_2 .125$

h = 3

TEORIJA INFORMACIJE

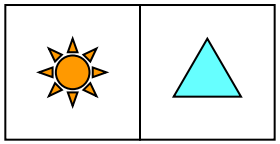
N = 1

p = 1



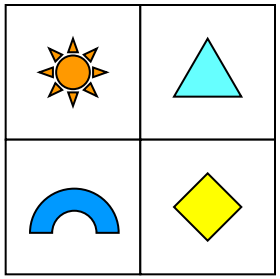
N = 2

p = .500



N = 4

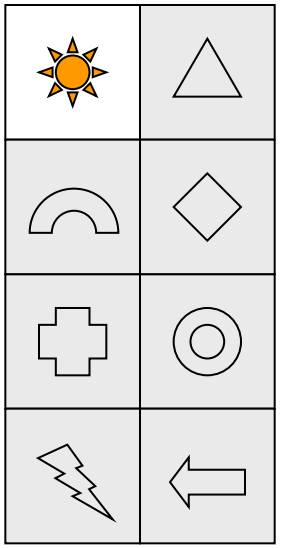
p = .250



3

N = 8

p = .125



2

1

$h = \log_2 1$

$h = -\log_2 1{,}0$

h = 0

$h = \log_2 2$

$h = -\log_2 .500$

h = 1

$h = \log_2 4$

$h = -\log_2 .250$

h = 2

$h = \log_2 8$

$h = -\log_2 .125$

h = 3

TEORIJA INFORMACIJE

Shannon & Weaver (1949)

$$h = f(N, p)$$

N Ukupan broj događaja

$N = \Sigma X$

$N = 2^h$ $\quad h = 1$ 1 bit

Podjednako verovatni događaji!

$h = \log_2 N$

p Verovatnoća događaja

$p = 1/N$

$h = \log_2 1/N$

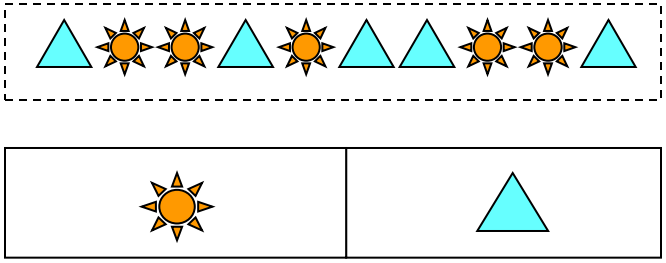
$h = - \log_2 p$

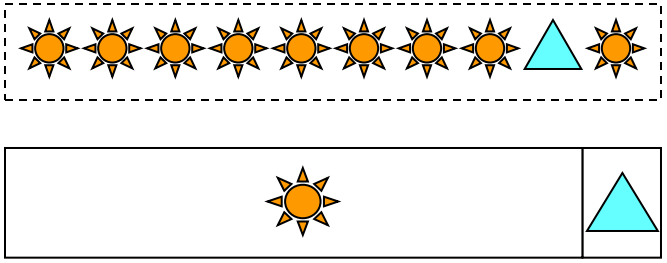
TEORIJA INFORMACIJE

Shannon & Weaver (1949)

Sistemi sa nejednakom verovatnoćom događaja p
(uređeni, “naštimovani” sistemi)

$h = - \log_2 p$





p = .50 p = .50

h = 1,0 h = 1,0

p = .90 p = .10

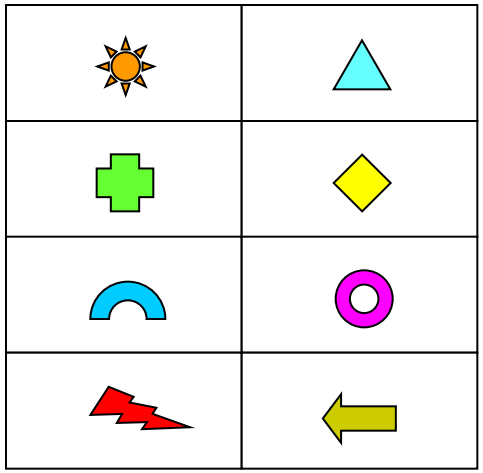
h = .15 h = 3,32

TEORIJA INFORMACIJE

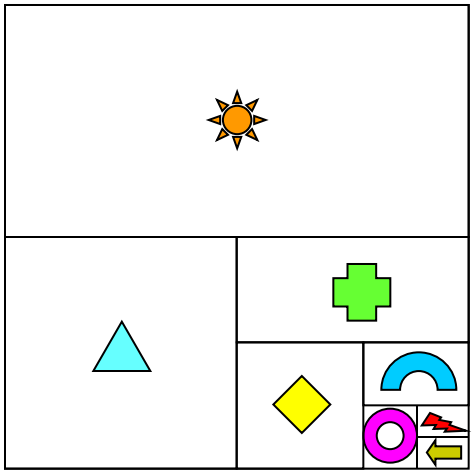
Shannon & Weaver (1949)

PROSEČNA KOLIČINA INFORMACIJE: Entropija (H)

$$H = - \Sigma\, p \log_2 p$$



H = 3



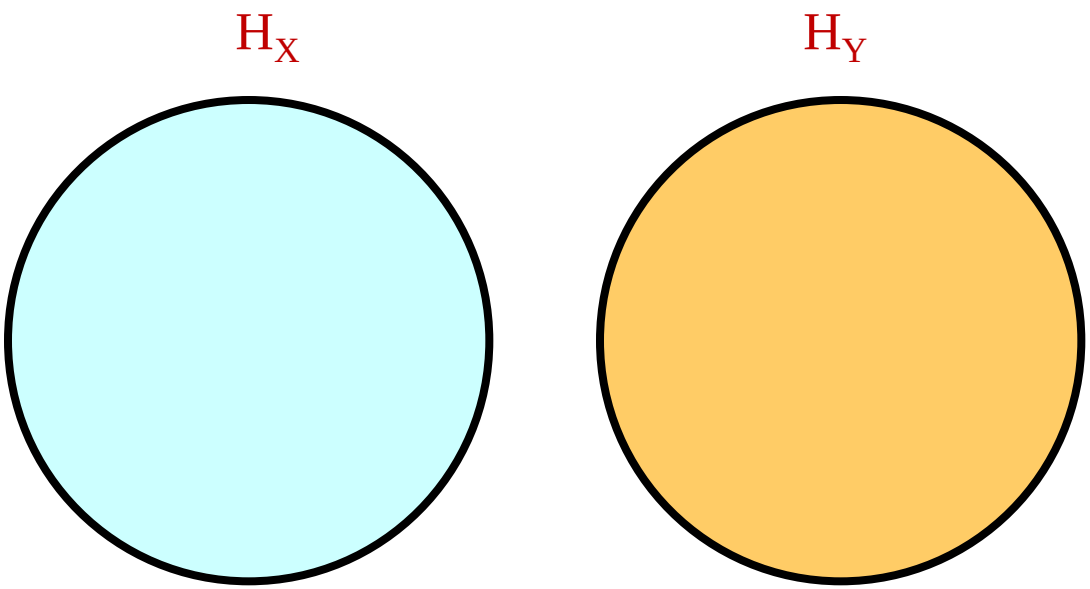
H = 2

TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Transmisiona situacija: Sistem X => Sistem Y

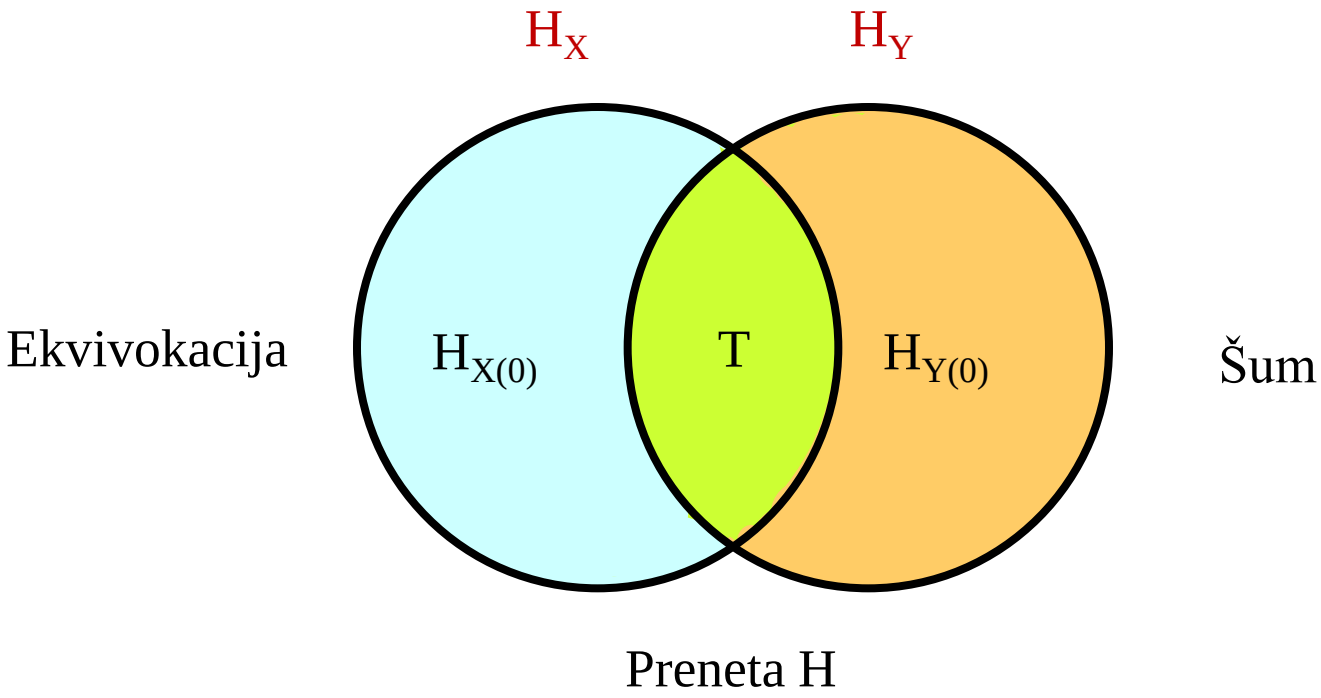


TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Transmisiona situacija: Sistem X => Sistem Y

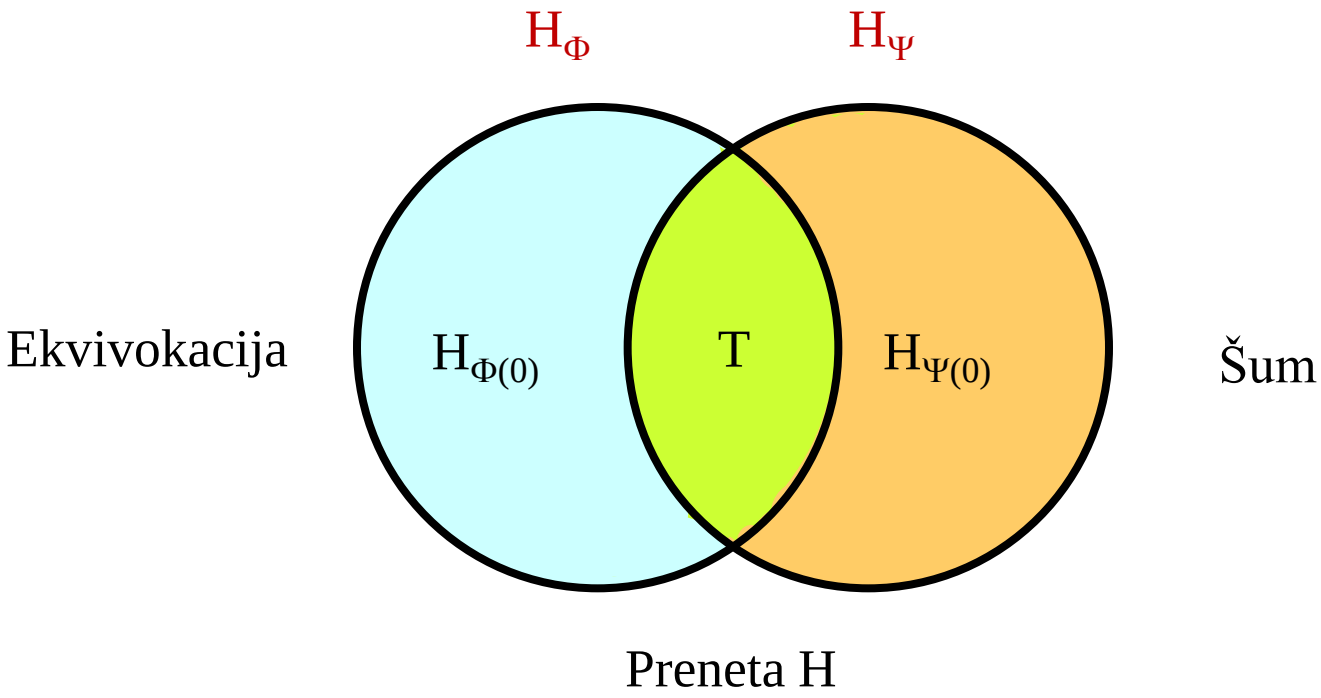


TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Psihofizička transmisija: Stimulacija Φ => Subjekt Ψ

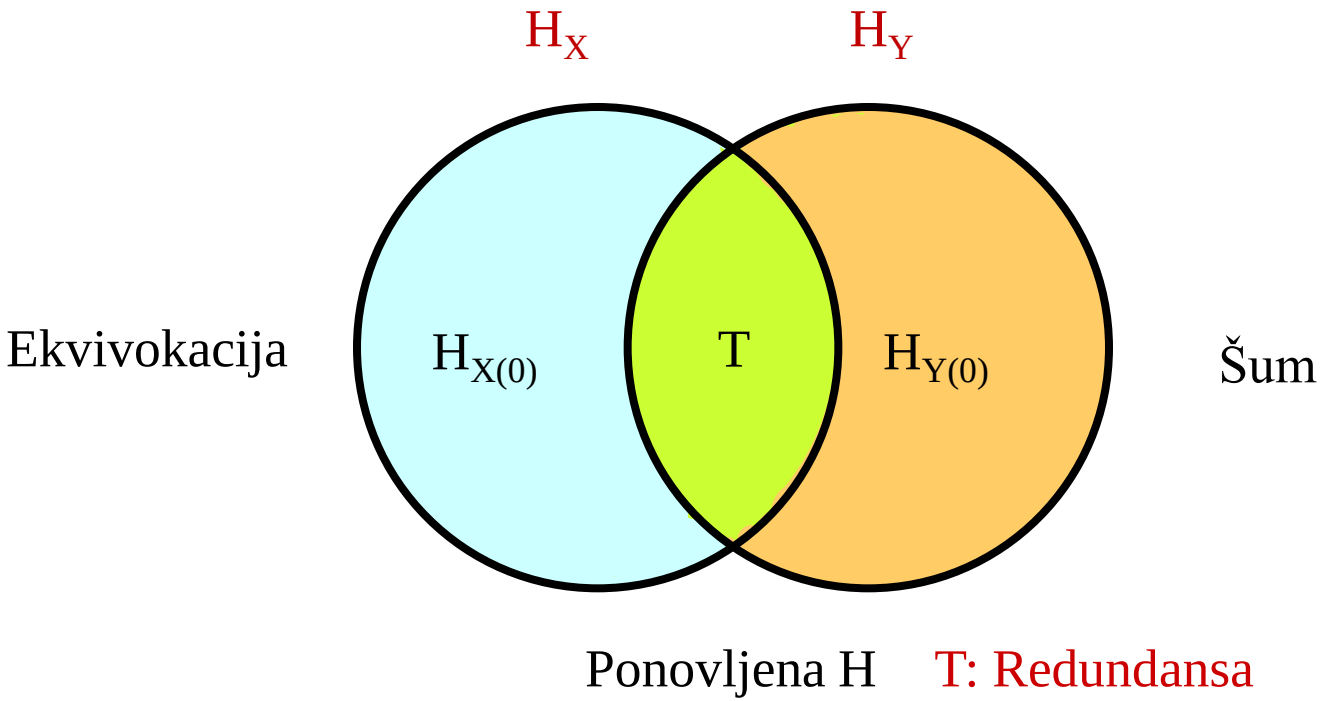


TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Sekvenciona situacija: Sistem u stanju X => Sistem u stanju Y

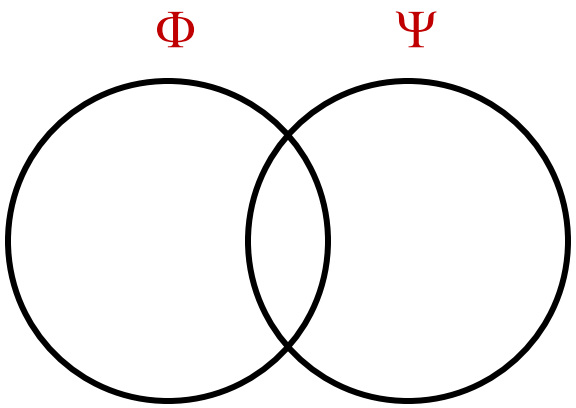


TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Povećanje redundanse (ponavljanje Φ) = > poboljšanje Ψ–Φ transmisije

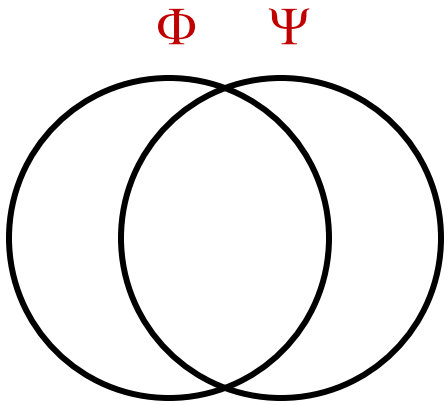


TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Povećanje redundanse (ponavljanje Φ) = > poboljšanje Ψ–Φ transmisije



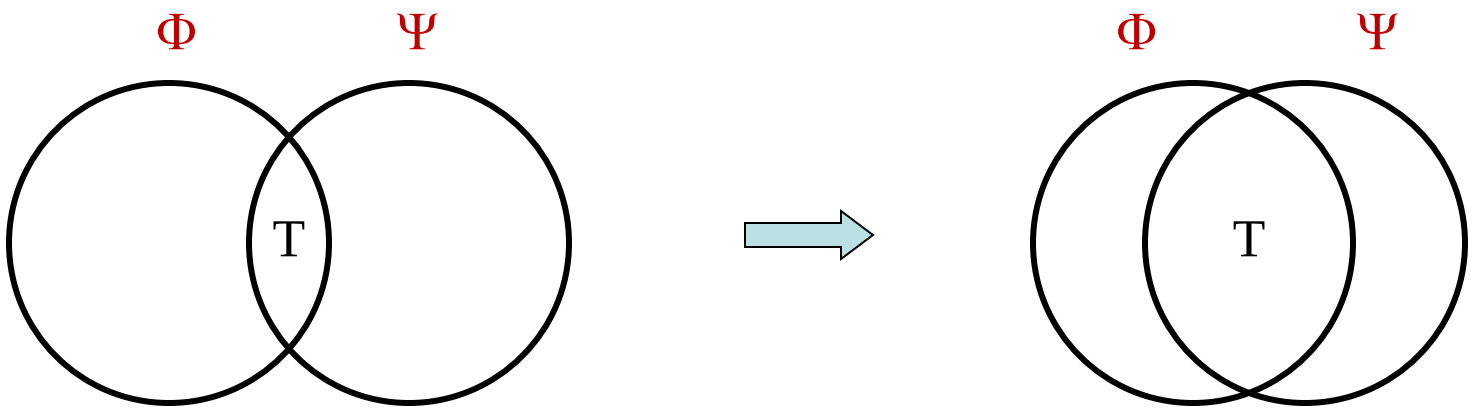
TEORIJA INFORMACIJE

G. Miller (1953)

KOMUNIKACIJA: Prenos informacija X => Y

Loša transmisija: Malo T

Bolja transmisija: Veće T



Ponavljanje Φ

FAKTORI PSIHOFIZIČKOG SUĐENJA

1. Intenzitet stimulacije
2. Motivacija (TDS)
3. Znanje, očekivanje (TDS)
4. Kontekst, verovatnoća (TI)

5. Prethodna stimulacija, nivo adaptacije (*Helson*)