Modeling Self-Interruption in a Dual-Task Setting

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Navy Relevance: Future Watchstanding

Future combat information centers (DD(X), CG(X), LCS)

- Net-centric warfare concepts
- Substantial reductions in crew size

New watchstanding paradigm

- Significantly increased visual display space
- Task optimizations and automated decision support
- Multiple systems supervised by a single operator

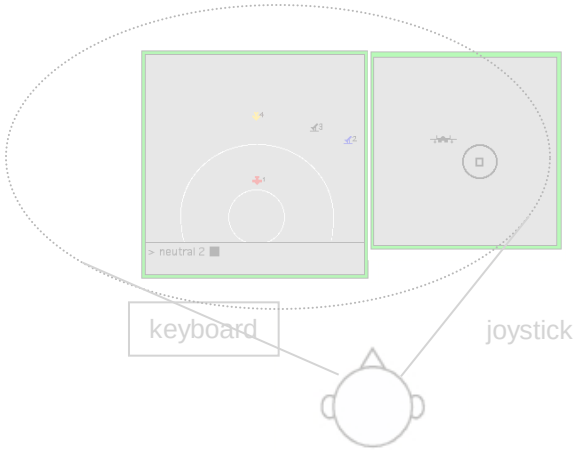
Risk: reduced situation awareness due to:

- Informational complexity
- Task load
- Concurrency
- Interruptions
- Communications
- Divided visual attention

The Solution?

Dual task test bed

Split-screen Configuration: Modeling issues



EPIC did not support head movements

Could we reproduce observed benefits from auditory cues?

How do users decide when to switch between tasks?

Observed Data (2002)

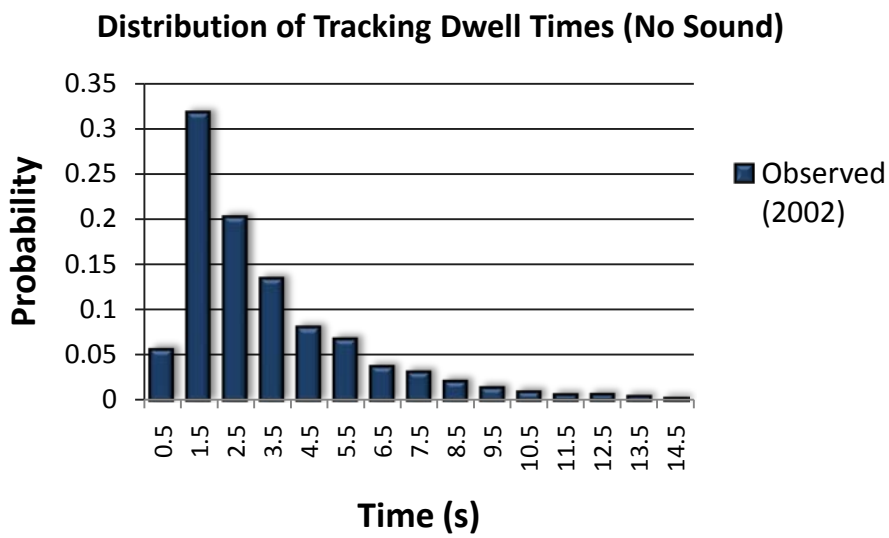
Number of Head Turns

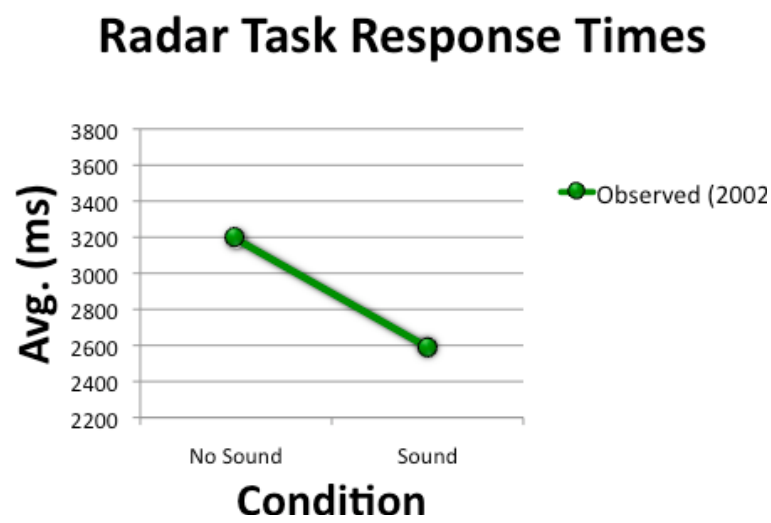
Distribution of Dwell Times

Reaction Times

No-sound: Mean Counts of Attention Shifts: Observed 2002

(shift from)	Tracking	Tactical	Keybd	
Tracking to		174	7	180
Tactical to	170		27	197
Keybd to	10	23		34
	180	197	34	411





Stochastic Model and Results

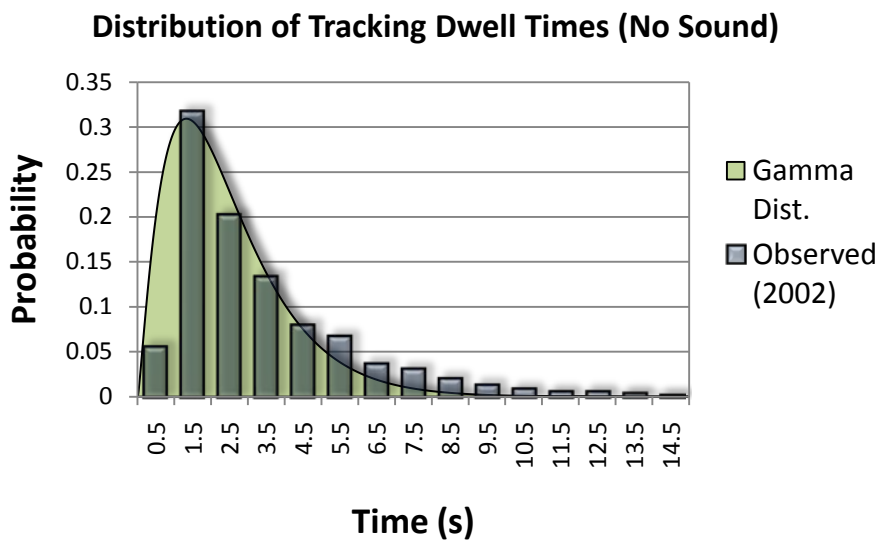
Number of Head Turns

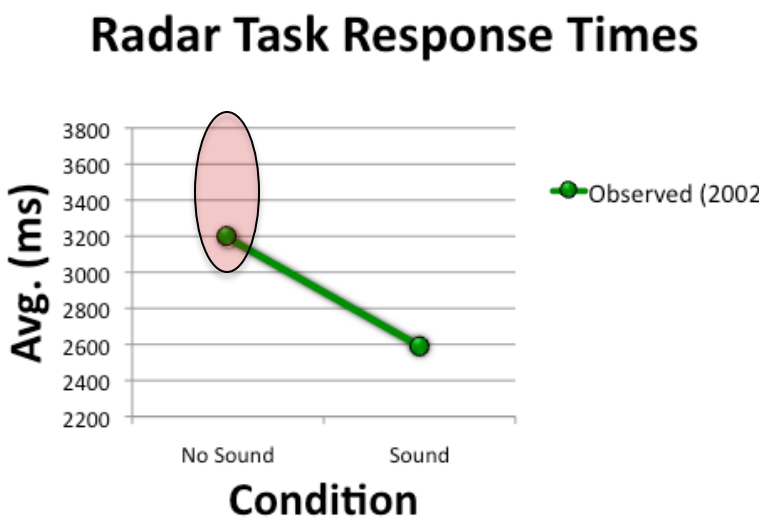
Distribution of Dwell Times

Reaction Times

No-sound: Mean Counts of Attention Shifts: model (obs.)

(shift from)	Tracking	Tactical	Keybd	
Tracking to		174 (174)	0 (7)	174 (180)
Tactical to	168 (170)		25 (27)	193 (197)
Keybd to	7 (10)	18 (23)		25 (34)
	175 (180)	192 (197)	25 (34)	392 (411)





Modeling Urgency

Stochastic Model

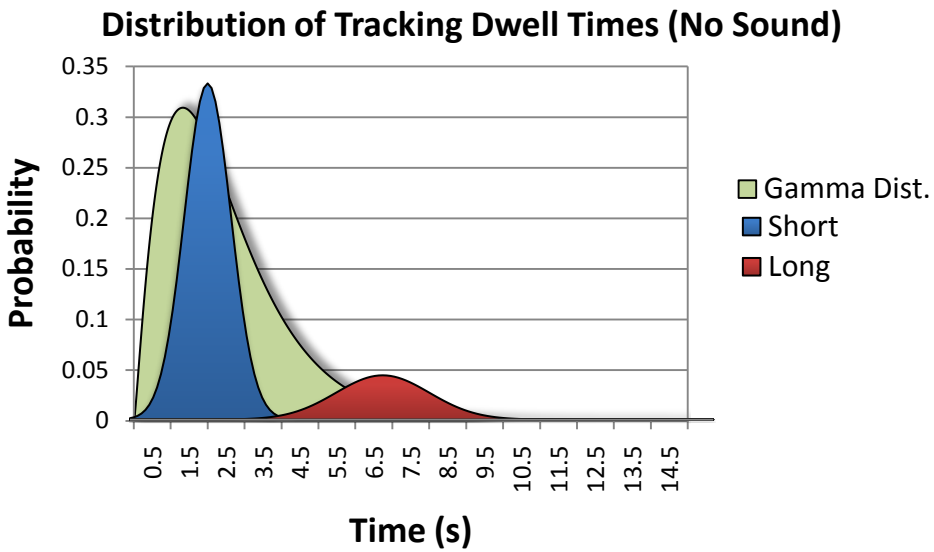
Always polls from the same distribution

Does not capture human reasoning

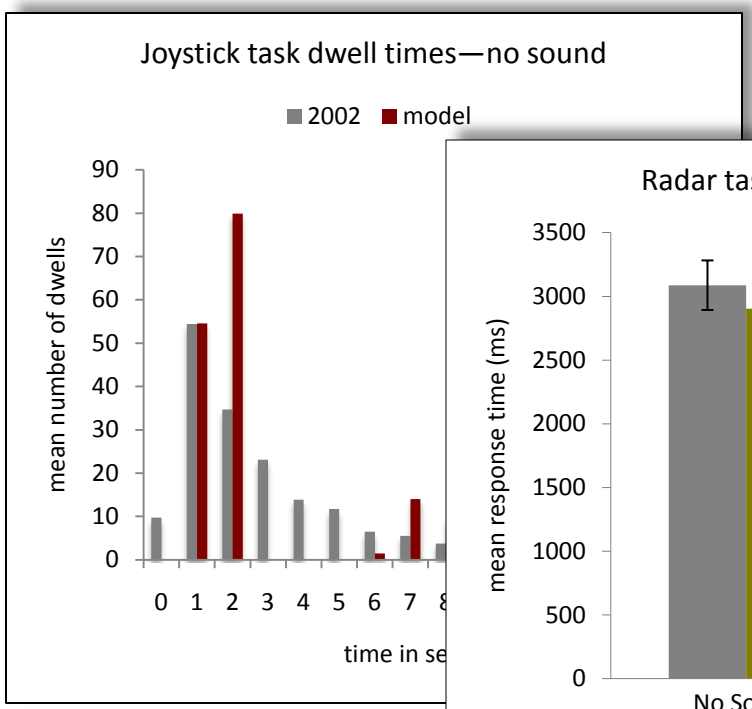
Urgency Model

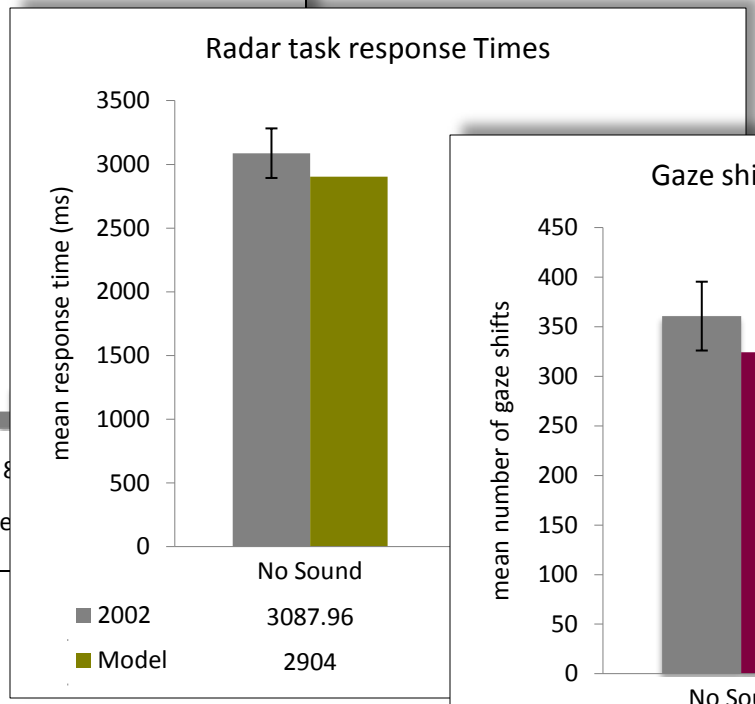
Uses Taatjen Timing rather than Gamma Distribution

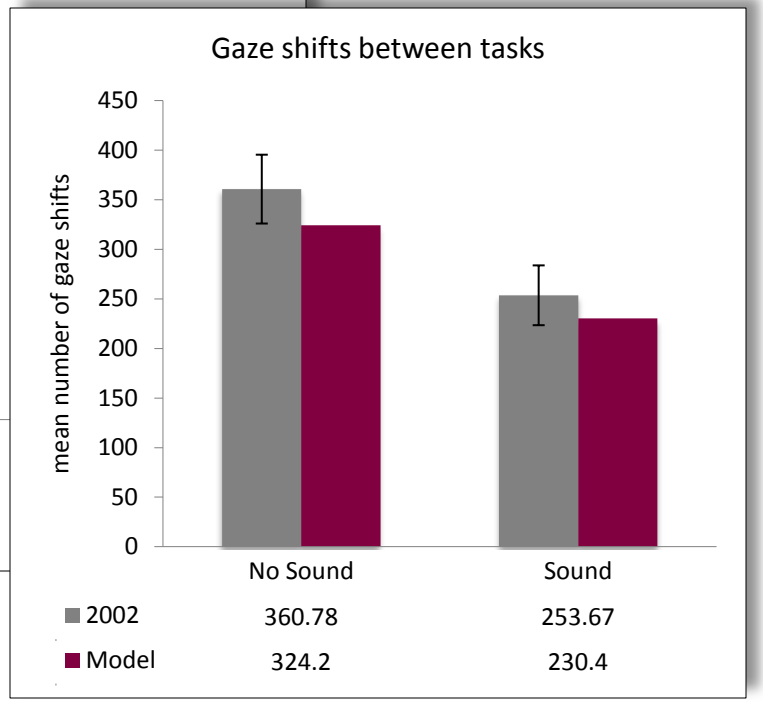
Simplistic, binary model of urgency



Urgency Model Results



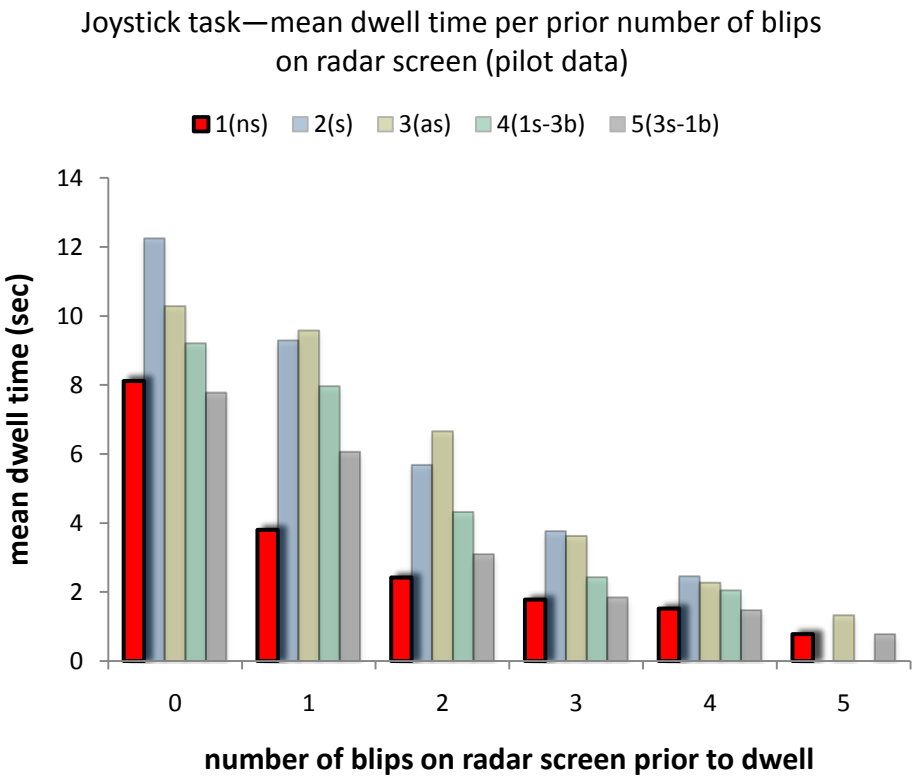




New NRL Dual-task Study: Preliminary Results

New Head-tracking Data

- Improve accuracy of observed data
- Associate individual head turns with state of radar task
- Measure reaction times to auditory cues



Future Work

Data Analysis

- Compare new data with 2002
- Examine possible measures of urgency
- Determine what additional features are available
- How is urgency acquired?

New Modeling

- Model more complex levels of urgency
- Model differences in No-Sound and Sound
- Generalize aspects of our models

New Testbed

- New research incorporates different tasks
- More flexible, modular

Thanks

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