Drug Name Confusion, Medication Reconciliation, and Medication Safety

Bruce L. Lambert, Ph.D.
Department of Pharmacy Administration
Department of Pharmacy Practice
Department of Communication
University of Illinois at Chicago
lambertb@uic.edu

Objectives

- By the end of this presentation, participants will be able to:
  - Explain the underlying cognitive processes that are involved in common medication errors (especially name confusions)
  - Identify the linkage between hospital-based reconciliation and safe drug use in the community at large.

MEDICAL CENTER HOSPITAL

500 - 600 W 4TH STREET   ODESSA, TEXAS   Ph. 333-711?

FOR _Vazquez Ramon_   AGE _____

ADDRESS _____   DATE _6/ 23/95_

Plendil 20 mg   # 120 —
20 mg P.O. Q6hrs

NO REFILLS ☐

Ferrous Sulfate 300 mg   # 100
300 mg P.O. TID c̄ meals

REFILLS

LABEL ☐

Humulin N
30 units SQ Q A.M.

Ramon Colla

_____   _____
PRODUCT SELECTION PERMITTED   **DISPENSE AS WRITTEN**

D.E.A. #

739 637 7-88   IH 88-270

http://www.medmal-law.com/illegibl.htm

Plendil or Isordil?

- Isordil® prescribed
- Plendil® dispensed
- Cardiologist found negligent
- $450,000 damage award
- First ever award for bad penmanship!

Drug Name Confusions

- Account for 15-25% of all reported medication errors in the US
- 0.13% of all outpatient Rx's involve "wrong drug errors"
  - 4.55 million errors/year based on 3.5 billon Rxs
- Specifically identified by IOM in their report on medical errors
- Mandated initiatives underway at FDA to address the problem

Why Do These Errors Happen

- Similarity- and frequency-based errors in cognitive processing
- Memory (recall and recognition)
- Perception (visual and auditory)
- Motor control (picking wrong drug from drop-down menu)
- Poorly designed systems (e.g., handwritten orders, oral orders, no CPOE, etc.)

Examples (from USP-MERP)

- Lamisil® vs. Lamicel®
- Accupril® vs. Accutane®
- Celebrex® vs. Celexa®
- Cisplatin vs. carboplatin
- Hydroxyzine vs. Hydralazine
- Zosyn® vs. Zofran®
- Prilosec® vs. Prozac®
- Pediapred® vs. Pediaprofen®
- Prepridil® vs. Bepridil®

Examples (from JCAHO)

- cisplatin/carboplatin
- ephedrine/epinephrine
- Fentanyl/sufentanil
- hydromorphone/morphine
- Humalog/Humalin
- Taxotere/Taxol
- Lamisil/Lamictal

Confusion not limited to drug names!

Plaque muddles Luther King killer with Hollywood actor

Officials are blaming a mix-up after a plaque honored the man who killed Martin Luther King instead of actor James Earl Jones.

The actor was the voice of Star Wars' Darth Vader and The Lion King's Mufasa.

The plaque, however, commemorated James Earl *Ray* for "keeping the dream alive"...

STAMPS ISSUED IN HONOR OF BLACK HERITAGE

Thank you
James Earl Ray
for Keeping the Dream Alive
City of Lauderhill
January 19, 2002

Jim Ryan battles voter 'confusion' (Sun Times, 8/27/02)

"I'm not George Ryan," Attorney General Jim Ryan said Monday.

Repeatedly.

It's not easy sharing a surname with a governor who has more baggage than an airline.

Jim Ryan kept re-stating his identity at a news conference where he picked up the endorsement of the Illinois State Chamber of Commerce, the state's largest business organization. But the session was dominated by discussion of "the confusion factor" as the GOP nominee for governor fielded questions about a new poll showing his Democratic opponent, Rod Blagojevich, with a 14.6-point lead.

Carl Linnaeus even warned us!

- The quote is from Carl Linnaeus discussing the rules one should use to assign names to species and such. Rule Number 228 is:

- "Generic names with a similar sound give a handle to confusion"

- Linnaeus, C. Critica Botanica, 1737 (quoted in Stern, W. T. Systematic Zoology, 1959, vol. 8, p. 8)

Visual Perception of Drug Names

- Perceptual features at multiple layers of abstraction (e.g., segment, letter, word)
- Spreading activation between layers
- Activation/competition models
- Influence of similarity and frequency

Interactive Activation Model

Word Level

| fine | file | fire | hire |

fare

wire

Letter Level

| **F** | **I** | **R** | **E** |

F   **I**   **R**   **E**
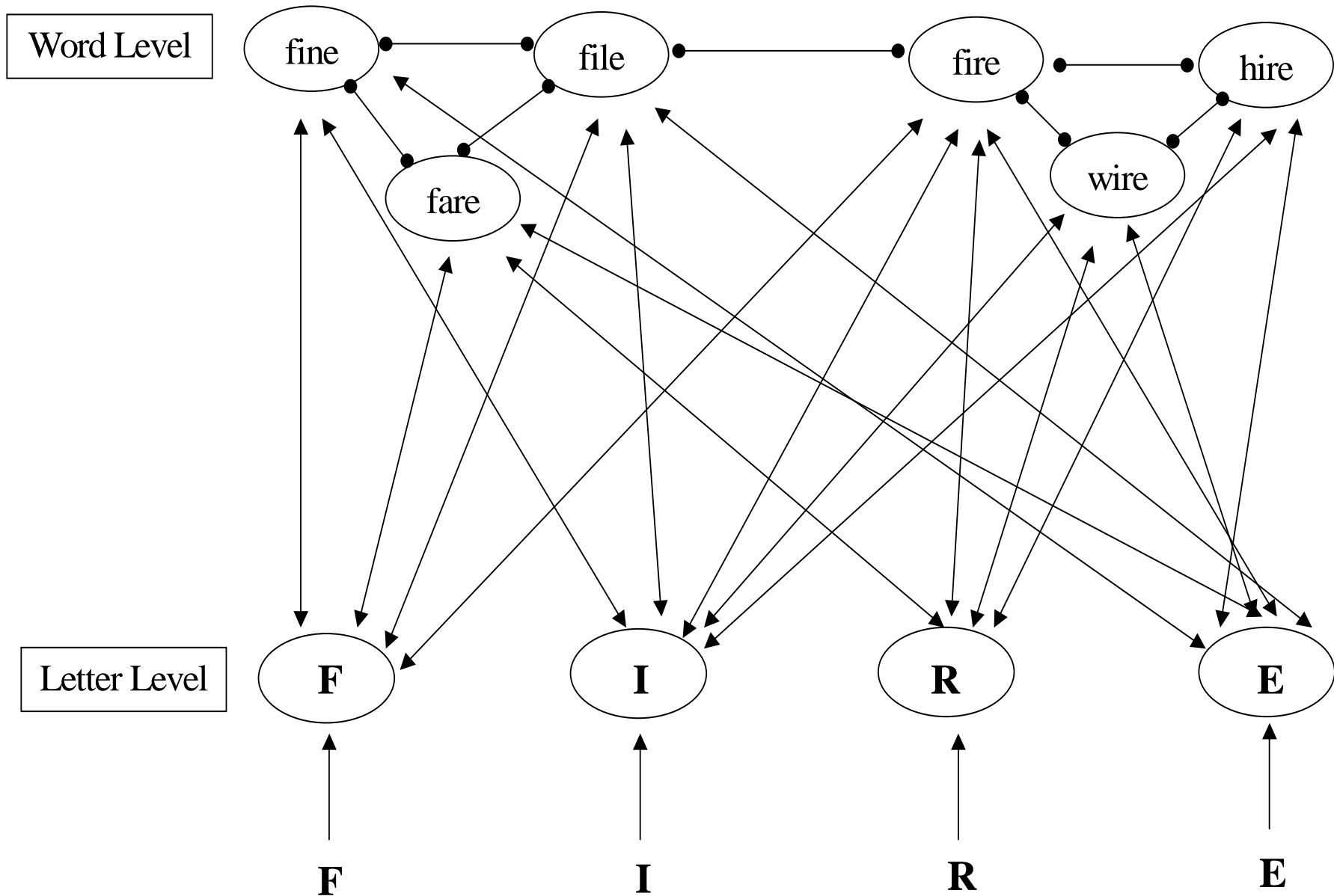
Similarity and Frequency

- In general, frequency (of prescribing) increases perceptual accuracy
- In general, similarity (to other names) decreases perceptual accuracy

Definitions

- **Stimulus Frequency**: the log prescribing frequency of a given drug
- **Neighborhood**: the set of names within a given distance (3 edits) of a stimulus name
- **Neighborhood density**: the number of other names in a stimulus word's neighborhood
- **Neighborhood frequency**: the mean log prescribing frequency of the names in the neighborhood
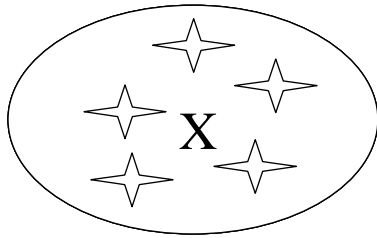
Neighborhood Illustration

Low frequency neighbor

High frequency neighbor
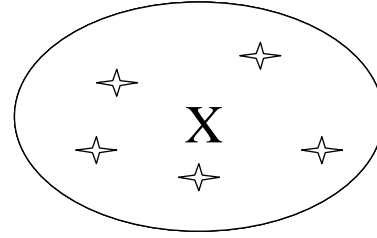
X

Neighborhood radius

Target name
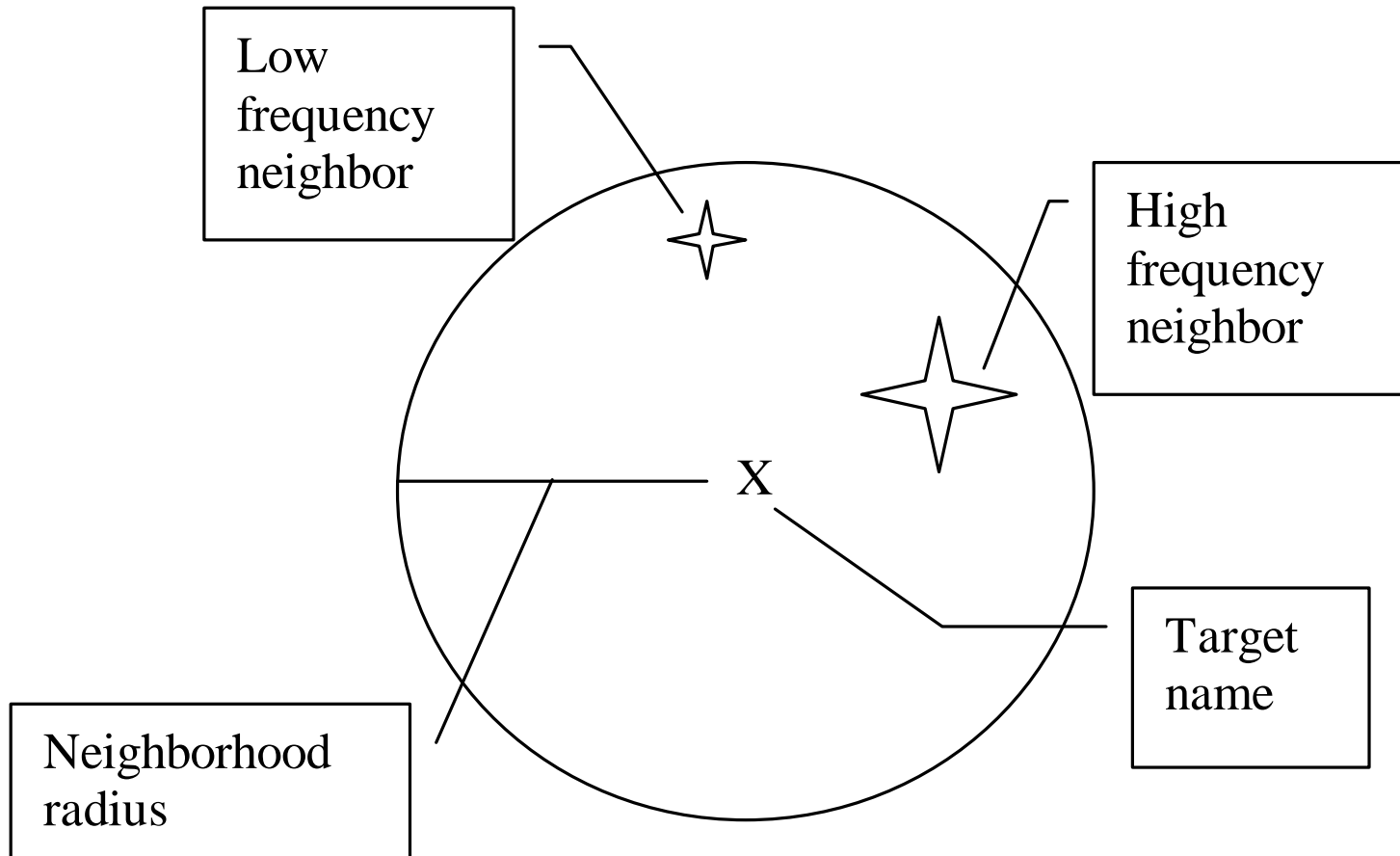
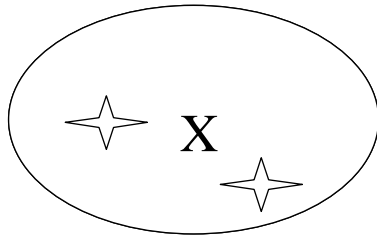# Dense Neighborhoods: High and Low Frequency
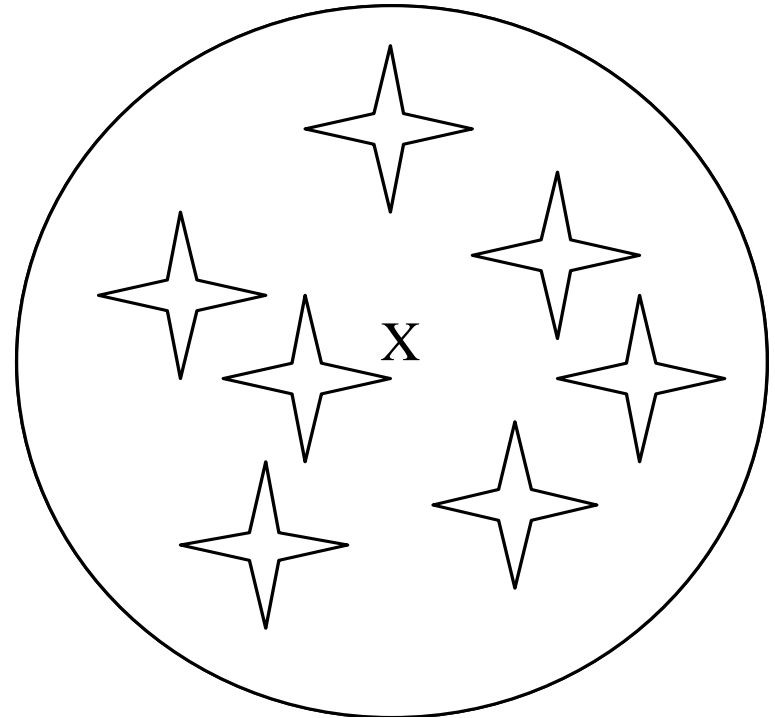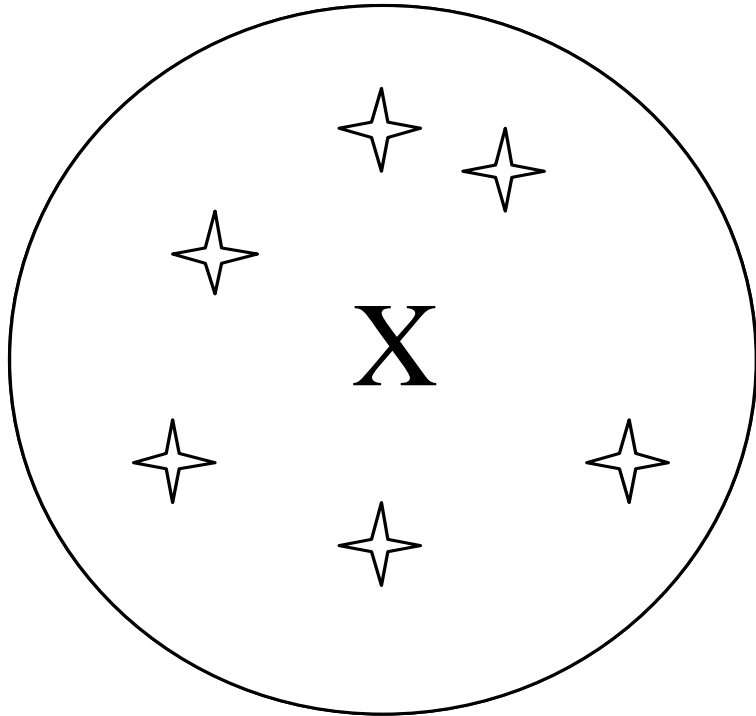
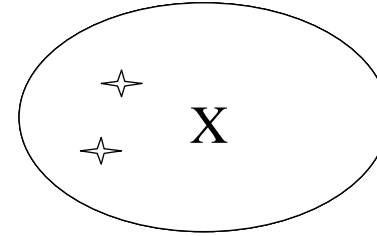1) High SF, High NF, High ND
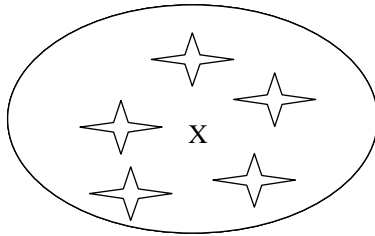

2) High SF, Low NF, High ND
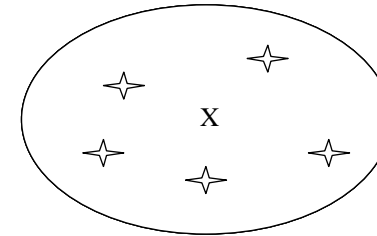

3) High SF, High NF, Low ND
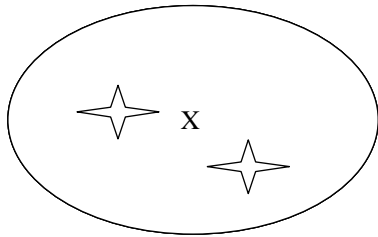

4) High SF, Low NF, Low ND

5) Low SF, High NF, High ND

6) Low SF, Low NF, High ND
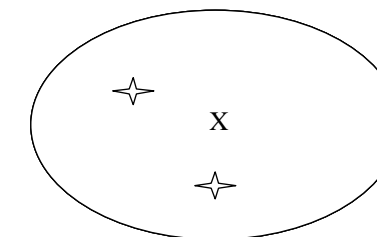

7) Low SF, High NF, Low ND

8) Low SF, Low NF, Low ND

Examples

- High log SF names (log SF > 7): Ventolin®, Dyazide®, Provera®

- Low log SF names (log SF < 3): Vistazine®, Antispas®, Protaphane®

- Name from a sparse neighborhood: Flexeril® (no neighbors in NAMCS/NHAMCS)

- Name from a dense neighborhood: Dynabac®, Synalar®, Rynatan®, Dynapen®, Dynacirc®, Dynacin®, Cynobac®

Hypotheses

- Error rates in visual perception will increase as stimulus frequency decreases

- Error rates in visual perception will increase as neighborhood density increases

- Error rates in visual perception will increase as neighborhood frequency increases

Methods and Design

- Participants were licensed, practicing pharmacists drawn from attendees at the 2000 National Community Pharmacists Association annual meeting (N=37)
- Task is a noise-masked visual perception task
- Participant must identify a degraded drug name after 3-second exposure
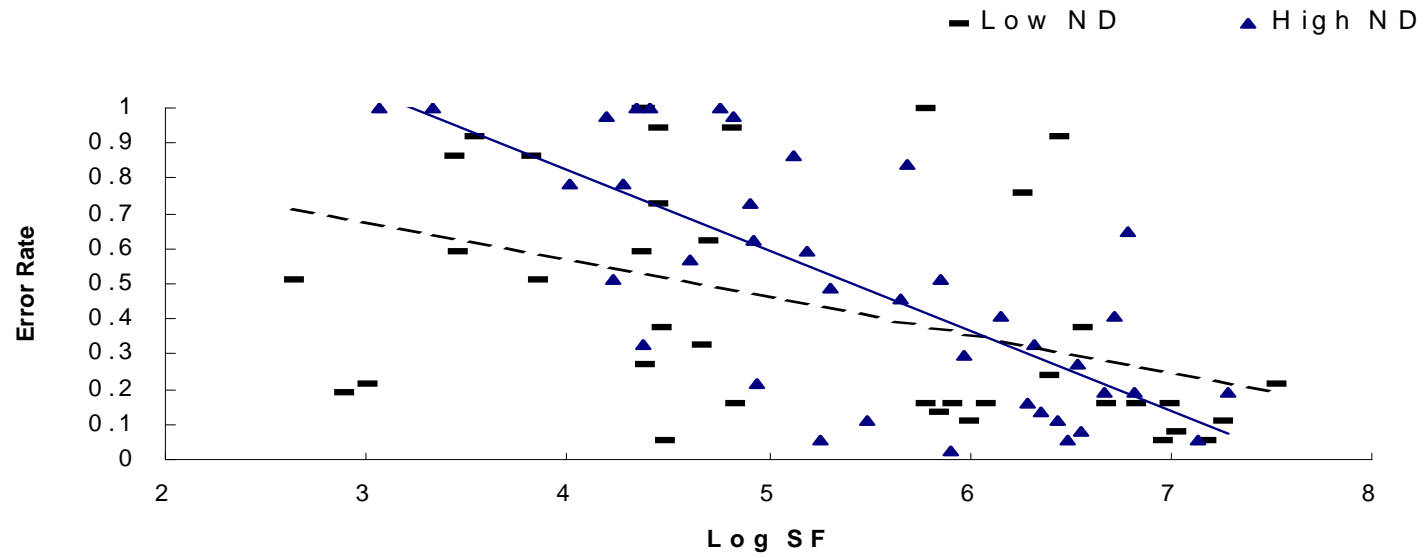
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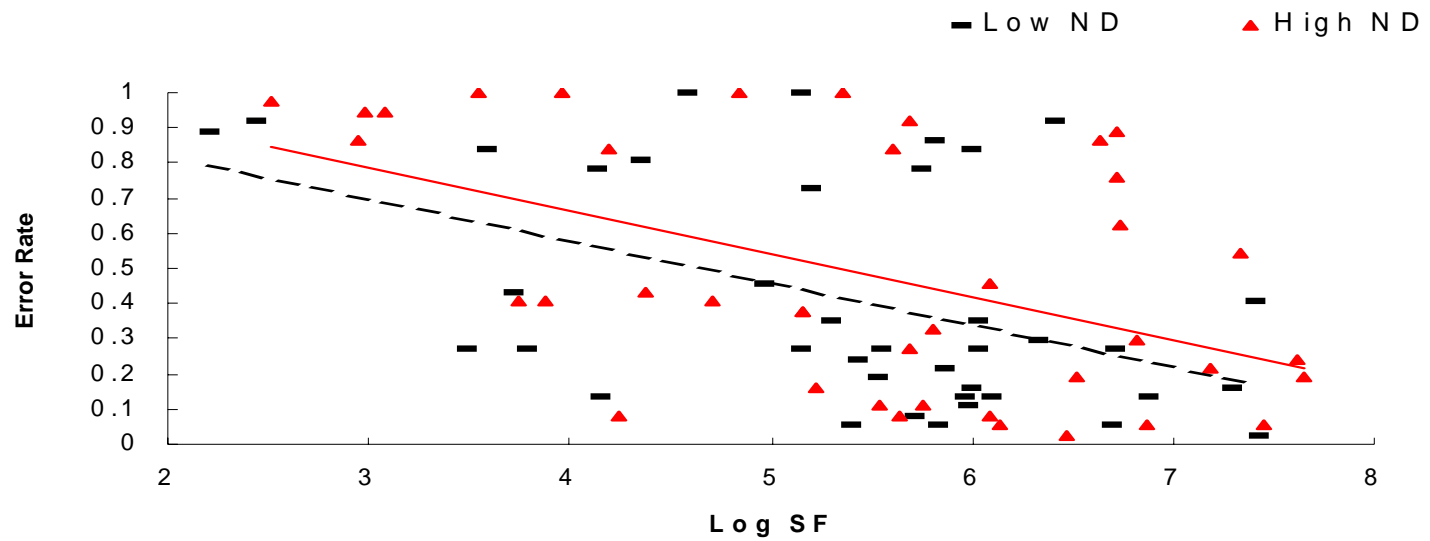
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ventoth

Solator

Procedure

- Pharmacist seated in front of Macintosh computer
- Drug names appear for 3 seconds
- Names degraded as if sent by a bad fax machine
- Row of XXXXs replaces name after 3 seconds
- Pharmacist types in correct response
- 5 practice trials, 160 test trials

(a) High NF

— Low ND   ▲ High ND

(b) Low NF

— Low ND   ▲ High ND

Discussion and Implications

- Similarity and frequency are still basic mechanisms of error. Look for them everywhere.

- Probability of error not most important endpoint

- Minimize harm

- Harm is a function of number of opportunities for error, probability of error and severity of error, probability of detecting error

Discussion and Implications

- Word frequency effect is extremely powerful. Rare names much more difficult to perceive than common names.

- Dense neighborhoods inhibit perception, especially of low frequency names in high frequency neighborhoods.

- Keep neighborhoods sparse to minimize error.

- Use neighborhood measures as part of pre-approval screening.

Conclusion

- The less frequently a drug name is prescribed, the more difficult it is to be perceived correctly in a noise-masked visual perception experiment.

- For low frequency words, the presence of similar neighbors significantly increases the probability of a perceptual error.

What about Prevention?

- Pre-approval screening
- Post-event labeling changes (e.g., Lamictal, cisplatin)
- CPOE-based solutions
- Safe prescribing practices
- Doctor-patient interaction
- Dispensing and administration fixes

Pre-Approval Screening

- FDA and manufacturer's joint responsibility
- Should use validated measures
- Should search on multiple attributes
- Criteria for acceptance/rejection of new names should be rational and explicit
- Companies soon mandated to submit pre-approval info about name confusion

Labeling Changes

CPOE-based Solutions

- Warnings on known confusing names
- Dose checking
- Indication checking
- Non-alphabetical presentation on menus
- Querying for distinguishing attributes
- "Tall man" lettering

Safe Medication Practices (from ISMP)

- Prescriptions should clearly specify the dosage form, drug strength, and complete directions.

- Include the product's indication on all outpatient prescriptions and on inpatient *prn* orders.

- With name pairs known to be problematic, reduce the potential for confusion by writing prescriptions using both the brand and generic name.

Safe Medication Practices (from ISMP)

- Accept verbal or telephone orders only when truly necessary. Encourage staff to repeat back all orders, spell the product name, and state its indication.

- When feasible, use magnifying lenses and copyholders under good lighting to keep prescriptions and orders at eye level during transcription.

Safe Medication Practices (from ISMP)

- ●Change the appearance of look-alike product names on computer screens, pharmacy and nursing unit shelf labels and bins (including automated dispensing cabinets), pharmacy product labels, and medication administration records by highlighting, through bold face, color, and/or tall man letters, the parts of the names that are different (e.g., hydr**OXY**zine, hydr**ALA**zine).
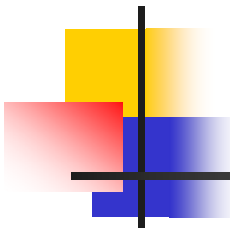
Safe Medication Practices (from ISMP)

- Affix "name alert" stickers to areas where look or sound-alike products are stored (available from pharmacy label manufacturers).

- Store products with look or sound-alike names in different locations. Avoid storing both products in the fast-mover area. Use a shelf sticker to help locate the product that is moved.

What Does this Have To Do With Medication Reconciliation

- Same cognitive processes that cause name confusions may cause reconciliation errors as well

- Name confusions can be one cause of unreconciled meds

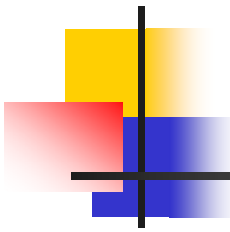- Both are just "points of entry" into the world of medication safety

Med/Rec across the Inpatient-Outpatient Divide

- Michael Reese Health Trust planning grant
  - Lambert & Schiff PIs
  - Lots of others involved
  - Still need more people to get involved
  - Should try to work with IHA collaborative participants
- Aim is to increase communication, coordination, and cooperation between inpatient and outpatient providers

Two Year Work Plan

- Year 1: Planning
  - Develop detailed work plan of how we will achieve these goals.
  - Recruit participating facilities.
- Year 2: Pilot Implementation
  - Engage, at a minimum, three sites to pilot program developed in Year 1.

Med/Rec across the Inpatient-Outpatient Divide

- Three components (at least)
  - Hospital
  - Community pharmacy
  - Office-based physicians
  - (Nursing homes?)
  - (Other hospitals?)

Questions and Challenges

- Admission, Discharge, or Transfer?
- Which patients?
- Which physicians?
- Which units or services in the hospital?
- Informed consent, HIPAA, privacy
- How to get two-way data flow with community pharmacy?

Enrollment Options

- Enrollment at hospital
- Enrollment at community pharmacy
- Enrollment at physician office**
- Need "acuity index" to determine which patients most likely to benefit (e.g., >10 Rxs)

Technology Issues

- Main goal is to increase communication, collaboration and coordination
- Only use technology if it helps achieve these three goals
- Technology is expensive, non-standard, can be distracting from main goals
- Technology is ubiquitous, inevitable
- Paper and pencil are "technologies"

Cultural and Sociological Issues

- Power differences impede reconciliation efforts
- Excess deference by less powerful
- Unwillingness to listen or acknowledge error by more powerful
- People more concerned with "saving face" than saving lives

Acknowledgments

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Summary

- By the end of this presentation, participants will be able to:
    - Explain the underlying cognitive processes that are involved in common medication errors (especially name confusions)
    - Identify the linkage between hospital-based reconciliation and safe drug use in the community at large.
- Did we achieve our objectives?