

# To See or Not to See? What does research say about the future of the DFL?

*THE NONPRESCRIPTION DRUG FACTS LABEL (DFL) IN A CHANGING CONSUMER MARKETPLACE 2021*

*LAURA BIX,  
MARK BECKER*



**WHO  
WILL?  
SPARTANS  
WILL.**



# Acknowledgements

FDA- Annie Painter, Teegan Dellibovi-Ragheb, Yoon Kong

MSU Extension– Cheryl Esbach, Marie Garcia, Christi Demitz,  
Lauryn Lin, Sean Knurek, Liz Josaitis

Tri County Office on Aging (TCOA)

RSVP

Patrick McDavid

Lanqing Liu

Andrew Rodriguez

Haoyang Wang

Dana Pontious

Connor O'Rourke

Connor Mitchell

- Bob Breslow
- Beth Martin



# Two Broad Approaches for Improving Labeling for Healthcare Products

Improve on the current approach

Leverage technology to shift the paradigm

# Gaps- Needs- Tools

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TENDENCY TO ASSESS  
COMPREHENSION (LATE STAGE  
PROCESSING)



NEED TO DRIVE ATTENTION TO  
INFORMATION THAT IS CRITICAL TO THE  
SAFE AND EFFECTIVE USE OF OTCS



NEED TO OBJECTIVELY MEASURE (NOT  
RELY ON SELF REPORTS OR  
CONJECTURE OF PERFORMANCE)

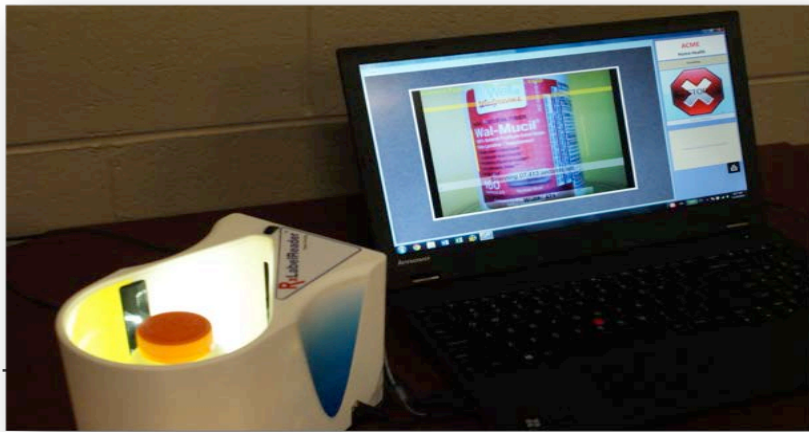
# Guiding principles

Use objective measures to determine the attentional prioritization of critical label information.

- Objective Measures of Attention: Eye-tracking, change detection, forced choice assessments, absolute judgement tasks

Does increasing attentional prioritization of critical information benefit use?

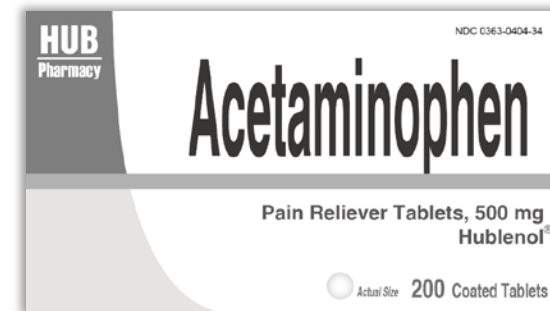
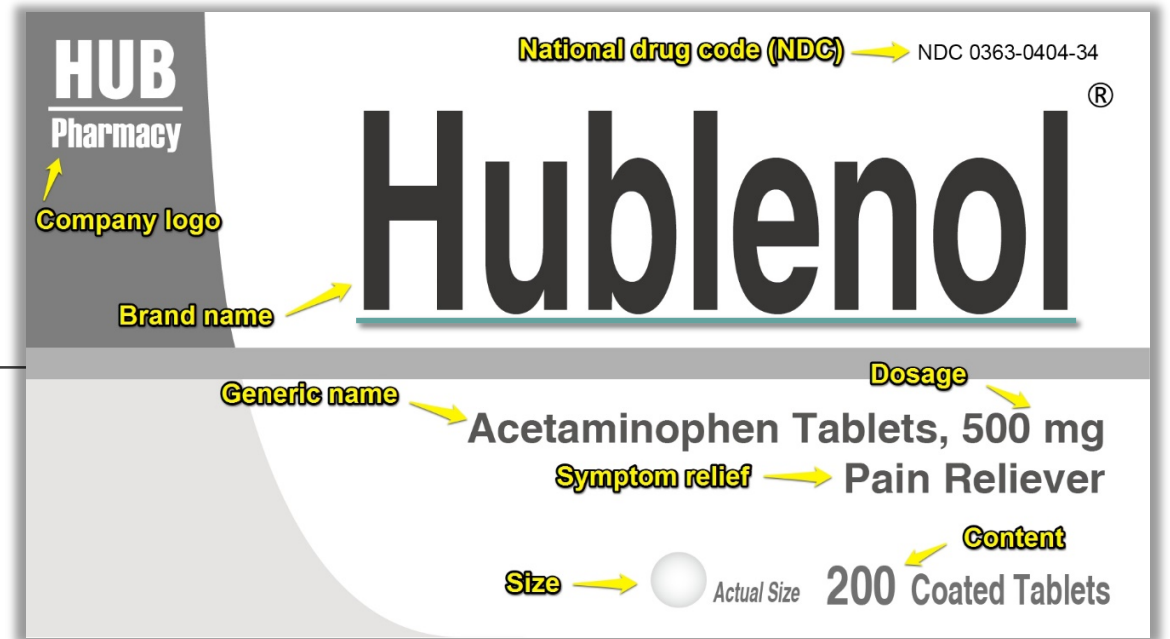
- Objective measures: Speed and Accuracy in making safety judgment.

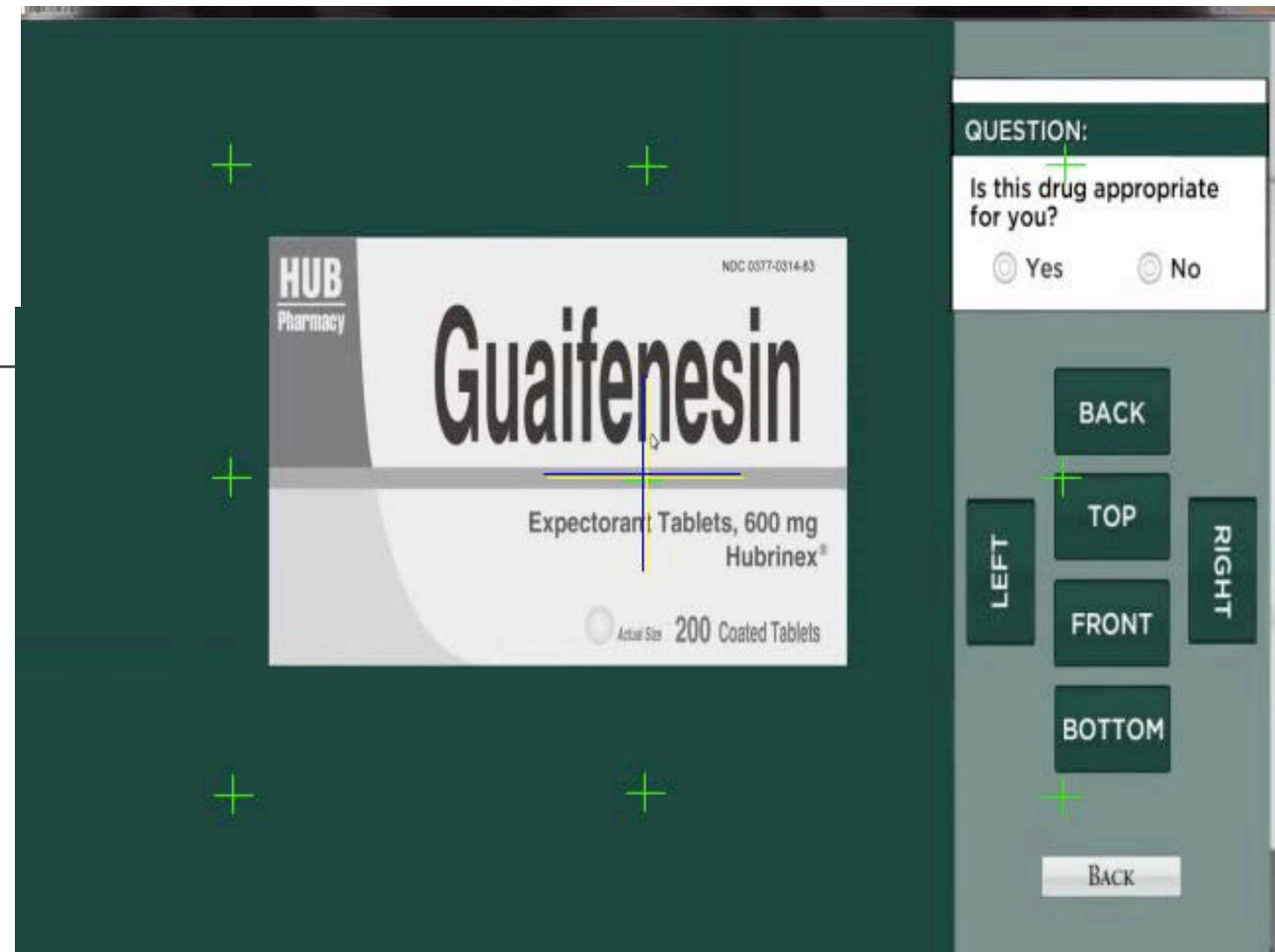


## Package stimulus design

- 3 drug categories x 3 active ingredients x 3 levels of formatting

- Total of 27 trials

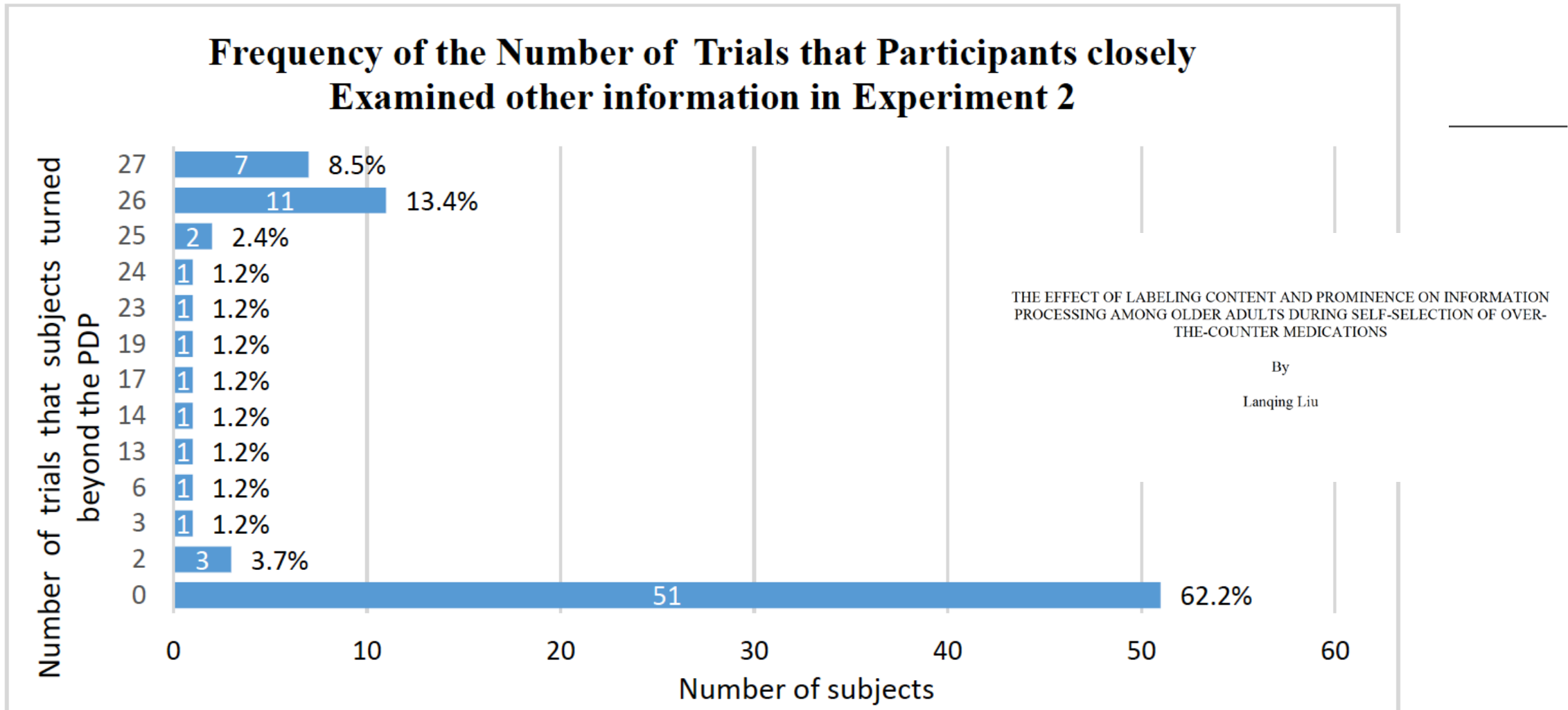




- Time to Area of Interest (AOI)
- Time Spent on AOI
- Gaze Trail (order of attendance)
- Number of hits to AOI
- Proportion of Respondents hitting AOI

# Gaming Eye Tracking

# Key Results



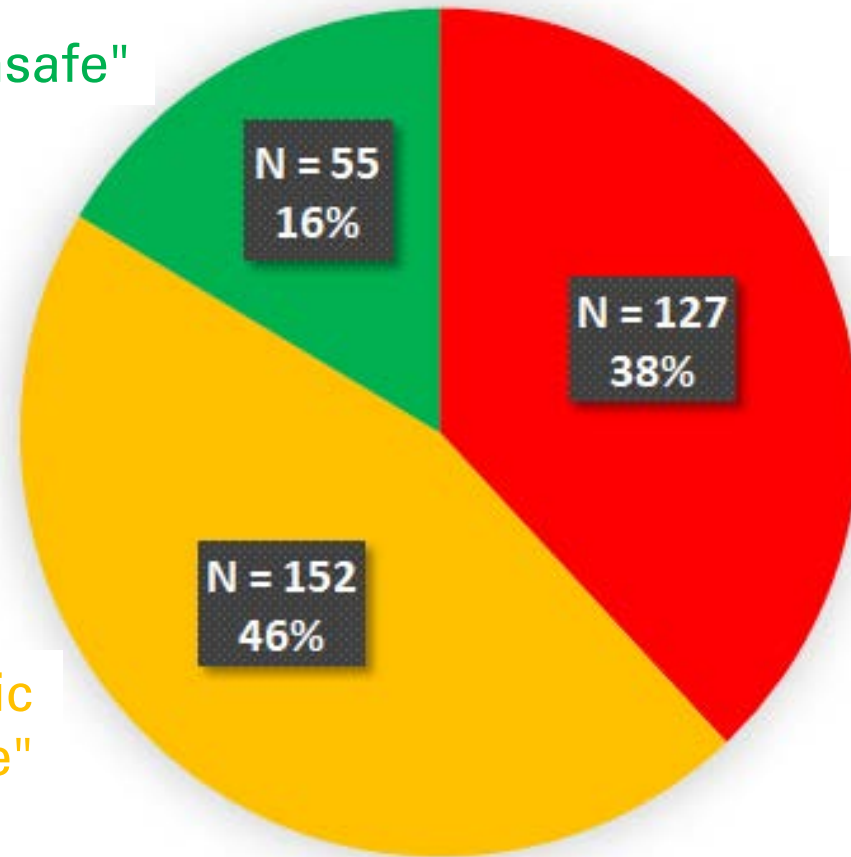
**Figure 21** Frequency of the number of trials that participants closely examined packages in Experiment 2



# Key Result – Subject Responses for Medications that Pharmacists Rated **UNSAFE For Subject** (N= 334)

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Correct Rating of "Unsafe"



Incorrect Rating of "Safe"

Potentially Problematic Rating of "Maybe Safe"

# Can we increase attention to critical health information?

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Canada Health Check



The Netherlands



Nordic Keyhole (Sweden, Norway and Denmark)



The Heart Symbol Finland

Health Logos

Each serving contains

Calories	Sugars	Fat	Saturates	Salt
218	6.3g	3.2g	1.4g	0.2g
11%	7%	5%	7%	3%

of an adult's guideline daily amount

Guideline Daily Amount (GDA)  
European Union

Each 1/2 pack serving contains

MED	LOW	MED	HIGH	MED
Calories	Sugar	Fat	Sat Fat	Salt
353	0.9g	20.3g	10.8g	1.1g
18%	1%	29%	54%	18%

of your guideline daily amount

Source: Food Standards Agency

Traffic Light Labelling (color) depicted with % GDA United Kingdom

PER SERVING

140 CALORIES	1g SAT FAT 5% DV	410mg SODIUM 17% DV	5g SUGARS
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Facts Up Front-  
An initiative of the Food Marketing Institute (FMI) and the Grocery Manufacturer's Association (GMA)  
United States

FOPs with  
Explicit information  
about Nutrients

Varied Front-of-Pack Nutrition Labels



# Leveraging Nutrition Labelling Research on Front-of-Package Labels



Contents lists available at ScienceDirect

Food Policy

journal homepage: [www.elsevier.com/locate/foodpol](http://www.elsevier.com/locate/foodpol)



Front of pack labels enhance attention to nutrition information in novel and commercial brands



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# Major Potential Barrier to Applying Front-of-Pack Approach to OTC Medications

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Is there consensus about which subset of information from the DFL is most important for reduction of ADRs?

# Survey of Experts (318 Practicing Pharmacists)

Ranked the importance of the Drug Facts Label headings required under FDA regulations (21CFR201.66\*) to reducing ADRs among older adults

Three headings rated as important (Over 75% consensus)

- Active Ingredient
- Purposes/Use
- Warnings

<p><b>Drug Facts</b></p> <p><b>Active ingredient (in each tablet)</b> ..... <b>Purpose</b>          Ibuprofen 200 mg (NSAID)* ..... Pain reliever/Fever reducer          *nonsteroidal anti-inflammatory drug</p>	<p><b>Drug Facts (continued)</b></p> <p><b>When using this product</b>          ■ take with food or milk if stomach upset occurs</p>
<p><b>Uses</b>          ■ temporarily relieves minor aches and pains due to:          ■ headache ■ toothache ■ backache          ■ menstrual cramps ■ the common cold ■ muscular aches          ■ minor pain of arthritis          ■ temporarily reduces fever</p>	<p><b>Stop use and ask a doctor if</b>          ■ you experience any of the following signs of stomach bleeding:          ■ feel faint ■ vomit blood          ■ have bloody or black stools          ■ have stomach pain that does not get better          ■ you have symptoms of heart problems or stroke:          ■ chest pain          ■ trouble breathing          ■ weakness in one part or side of body          ■ slurred speech ■ leg swelling          ■ pain gets worse or lasts more than 10 days          ■ fever gets worse or lasts more than 3 days          ■ redness or swelling is present in the painful area          ■ any new symptoms appear</p>
<p><b>Warnings</b>  <b>Allergy alert:</b> Ibuprofen may cause a severe allergic reaction, especially in people allergic to aspirin. Symptoms may include:          ■ hives ■ facial swelling ■ asthma (wheezing)          ■ shock ■ skin reddening ■ rash ■ blisters          If an allergic reaction occurs, stop use and seek medical help right away.  <b>Stomach bleeding warning:</b> This product contains an NSAID, which may cause severe stomach bleeding. The chance is higher if you          ■ are age 60 or older ■ have had stomach ulcers or bleeding problems          ■ take a blood thinning (anticoagulant) or steroid drug          ■ take other drugs containing prescription or nonprescription NSAIDs [aspirin, ibuprofen, naproxen, or others]          ■ have 3 or more alcoholic drinks every day while using this product          ■ take more or for a longer time than directed  <b>Heart attack and stroke warning:</b> NSAIDs, except aspirin, increase the risk of heart attack, heart failure, and stroke. These can be fatal. The risk is higher if you use more than directed or for longer than directed.</p>	<p><b>If pregnant or breast-feeding,</b> ask a health professional before use. It is especially important not to use ibuprofen during the last 3 months of pregnancy unless definitely directed to do so by a doctor because it may cause problems in the unborn child or complications during delivery.  <b>Keep out of reach of children.</b> In case of overdose, get medical help or contact a Poison Control Center right away.</p>
<p><b>Do not use</b>          ■ if you have ever had an allergic reaction to any other pain reliever/fever reducer          ■ right before or after heart surgery</p>	<p><b>Directions</b>          ■ do not take more than directed          ■ the smallest effective dose should be used          ■ adults and children 12 years and over: take 1 tablet every 4 to 6 hours while symptoms persist          ■ if pain or fever does not respond to 1 tablet, 2 tablets may be used          ■ do not exceed 6 tablets in 24 hours, unless directed by a doctor          ■ children under 12 years: ask a doctor</p>
<p><b>Ask a doctor before use if</b>          ■ stomach bleeding warning applies to you          ■ you have problems or serious side effects from taking pain relievers or fever reducers          ■ you have a history of stomach problems, such as heartburn          ■ you have high blood pressure, heart disease, liver cirrhosis, kidney disease, asthma, or had a stroke          ■ you are taking a diuretic</p>	<p><b>Other information</b>          ■ read all warnings and directions before use          ■ store at 20-25°C (68-77°F)          ■ avoid excessive heat above 40°C (104°F)</p>
<p><b>Ask a doctor or pharmacist before use if you are</b>          ■ under a doctor's care for any serious condition          ■ taking aspirin for heart attack or stroke, because ibuprofen may decrease this benefit of aspirin          ■ taking any other drug</p>	<p><b>Inactive ingredients</b>          acetylated monoglycerides, colloidal silicon dioxide, corn starch, croscarmellose sodium, methylparaben, microcrystalline cellulose, pharmaceutical glaze, pharmaceutical ink, povidone, pregelatinized starch, propylparaben, sodium benzoate, sodium lauryl sulfate, stearic acid, sucrose, synthetic iron oxide, titanium dioxide, white wax</p> <p><b>Questions or comments?</b>          call toll free 1-800-88-ADVIL</p>

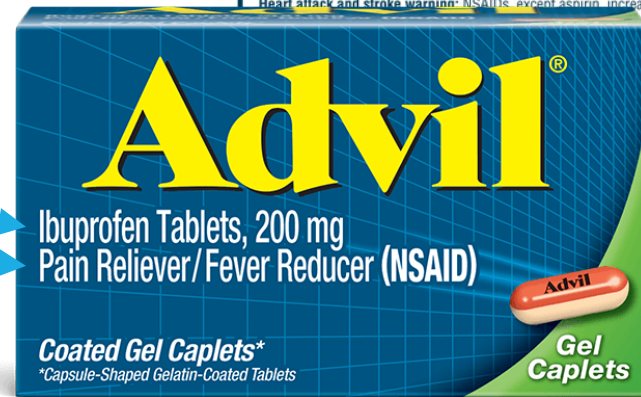
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<p><b>Drug Facts</b></p> <p><b>Active ingredient (in each tablet)</b> ..... <b>Purpose</b>          Ibuprofen 200 mg (NSAID)* ..... Pain reliever/Fever reducer          *nonsteroidal anti-inflammatory drug</p> <p><b>Uses</b></p> <ul style="list-style-type: none"> <li>■ temporarily relieves minor aches and pains due to:             <ul style="list-style-type: none"> <li>■ headache</li> <li>■ toothache</li> <li>■ backache</li> <li>■ menstrual cramps</li> <li>■ the common cold</li> <li>■ muscular aches</li> <li>■ minor pain of arthritis</li> <li>■ temporarily reduces fever</li> </ul> </li> </ul>	<p><b>Drug Facts (continued)</b></p> <p><b>When using this product</b></p> <ul style="list-style-type: none"> <li>■ take with food or milk if stomach upset occurs</li> </ul> <p><b>Stop use and ask a doctor if</b></p> <ul style="list-style-type: none"> <li>■ you experience any of the following signs of stomach bleeding:             <ul style="list-style-type: none"> <li>■ feel faint</li> <li>■ vomit blood</li> <li>■ have bloody or black stools</li> <li>■ have stomach pain that does not get better</li> </ul> </li> <li>■ you have symptoms of heart problems or stroke:             <ul style="list-style-type: none"> <li>■ chest pain</li> <li>■ trouble breathing</li> <li>■ weakness in one part or side of body</li> <li>■ slurred speech</li> <li>■ leg swelling</li> </ul> </li> <li>■ pain gets worse or lasts more than 10 days</li> <li>■ fever gets worse or lasts more than 3 days</li> <li>■ redness or swelling is present in the painful area</li> <li>■ any new symptoms appear</li> </ul>
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<p><b>Directions</b></p> <ul style="list-style-type: none"> <li>■ do not take more than directed</li> <li>■ the smallest effective dose should be used</li> <li>■ adults and children 12 years and over: take 1 tablet every 4 to 6 hours while symptoms persist</li> <li>■ if pain or fever does not respond to 1 tablet, 2 tablets may be used</li> <li>■ do not exceed 6 tablets in 24 hours, unless directed by a doctor</li> <li>■ children under 12 years: ask a doctor</li> </ul>	<p><b>Other information</b></p> <ul style="list-style-type: none"> <li>■ read all warnings and directions before use</li> <li>■ store at 20-25°C (68-77°F)</li> <li>■ avoid excessive heat above 40°C (104°F)</li> </ul>
<p><b>Inactive ingredients</b></p> <p>acetylated monoglycerides, colloidal silicon dioxide, corn starch, croscarmellose sodium, methylparaben, microcrystalline cellulose, pharmaceutical glaze, pharmaceutical ink, povidone, pregelatinized starch, propylparaben, sodium benzoate, sodium lauryl sulfate, stearic acid, sucrose, synthetic iron oxide, titanium dioxide, white wax</p> <p><b>Questions or comments?</b>          call toll free 1-800-88-ADVIL</p>	

\* Follow-up work determined that pharmacists did not differentiate between "purpose" and "use" so these were collapsed

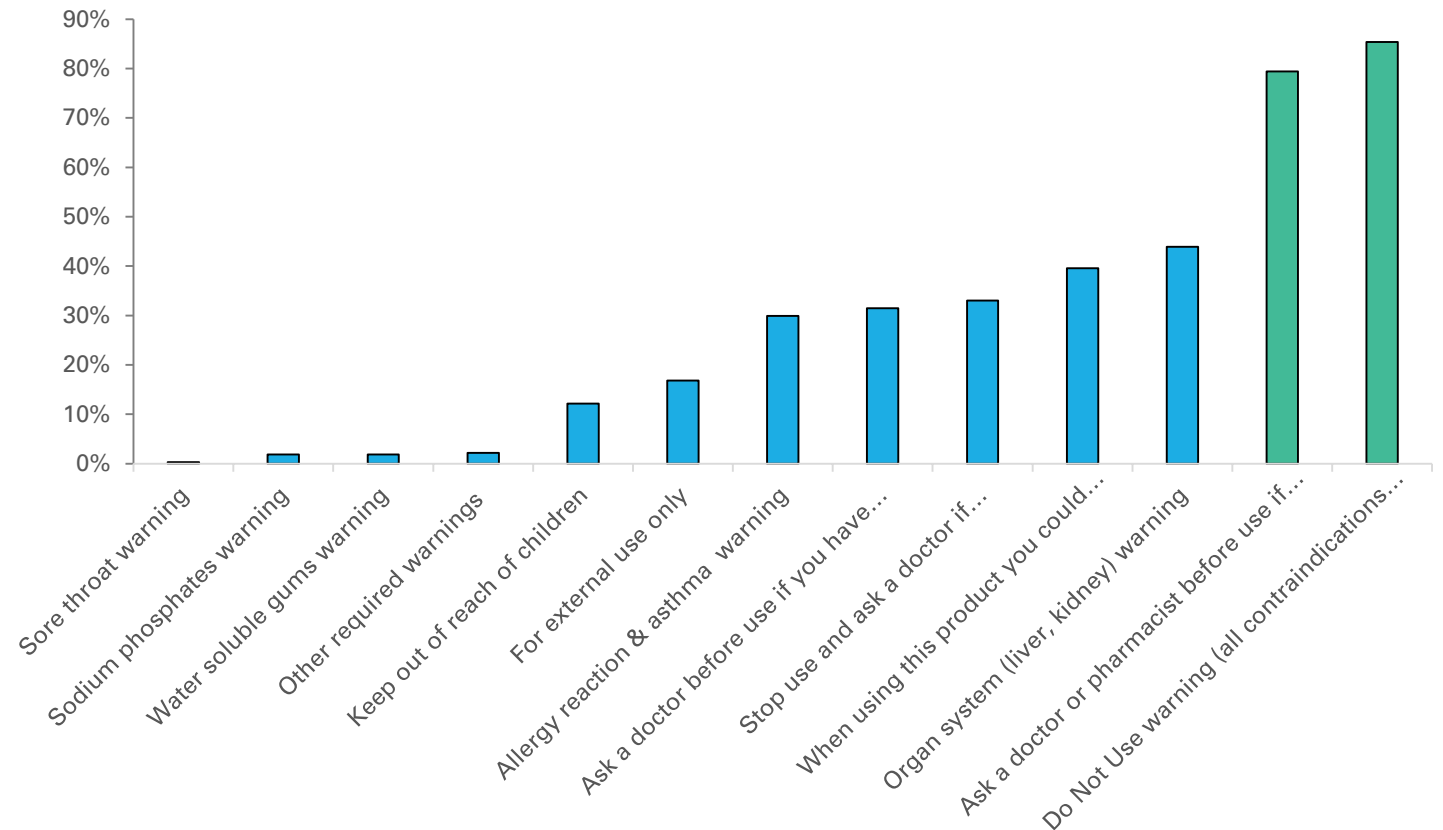
# Key Survey Result – Important Types of Warnings

Consensus (>75%) that two warnings are important.

- Do Not Use Warning
- Ask a Doctor or Pharmacist Before Use if you Are....

Basically, Drug-Drug or Drug-Diagnosis warnings.

% of Pharmacists Rating of Important Warnings (in top 4)

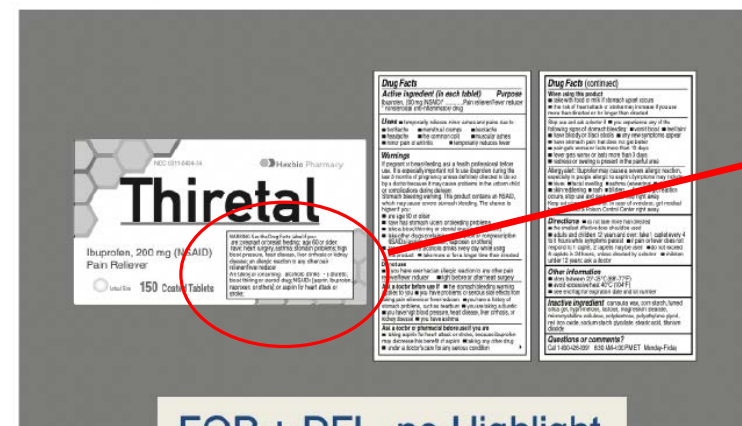


# Survey Results Used to Create Novel Labels (for next 2 experiments)

Front of Pack Warnings:  
capturing the drug-drug/drug-  
diagnosis warnings.



Standard DFL, no Highlight



FOP + DFL, no Highlight



# Survey Results Used to Create Novel Label Designs

## Designs (for next 2 experiments)

Front of Pack Warnings: capturing the drug-drug/drug-diagnosis warnings.



Standard DFL, no Highlight



Standard DFL, with Highlight

AND

Highlighting/No Highlighting of critical information (active ingredients and warnings)



FOP + DFL, no Highlight



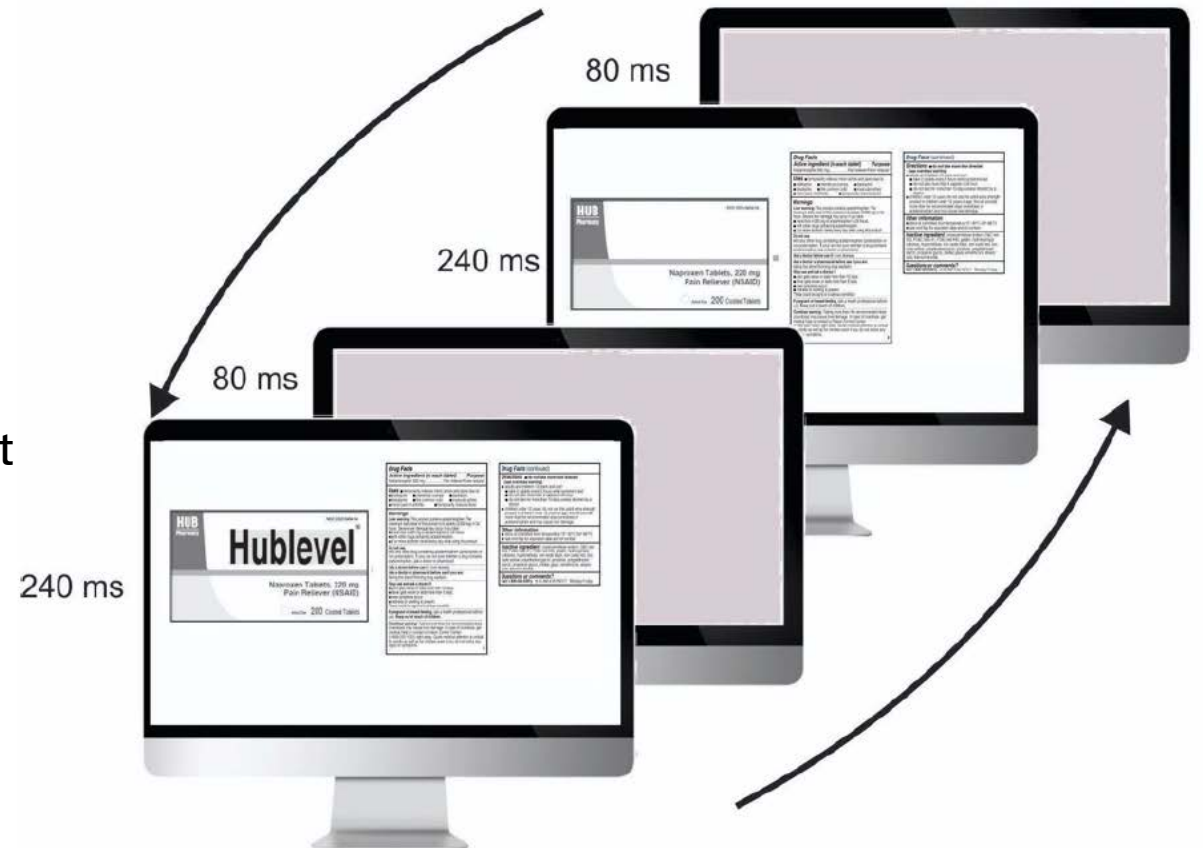
FOP + DFL, with Highlight

# Experiment 1: Attention to Critical Information

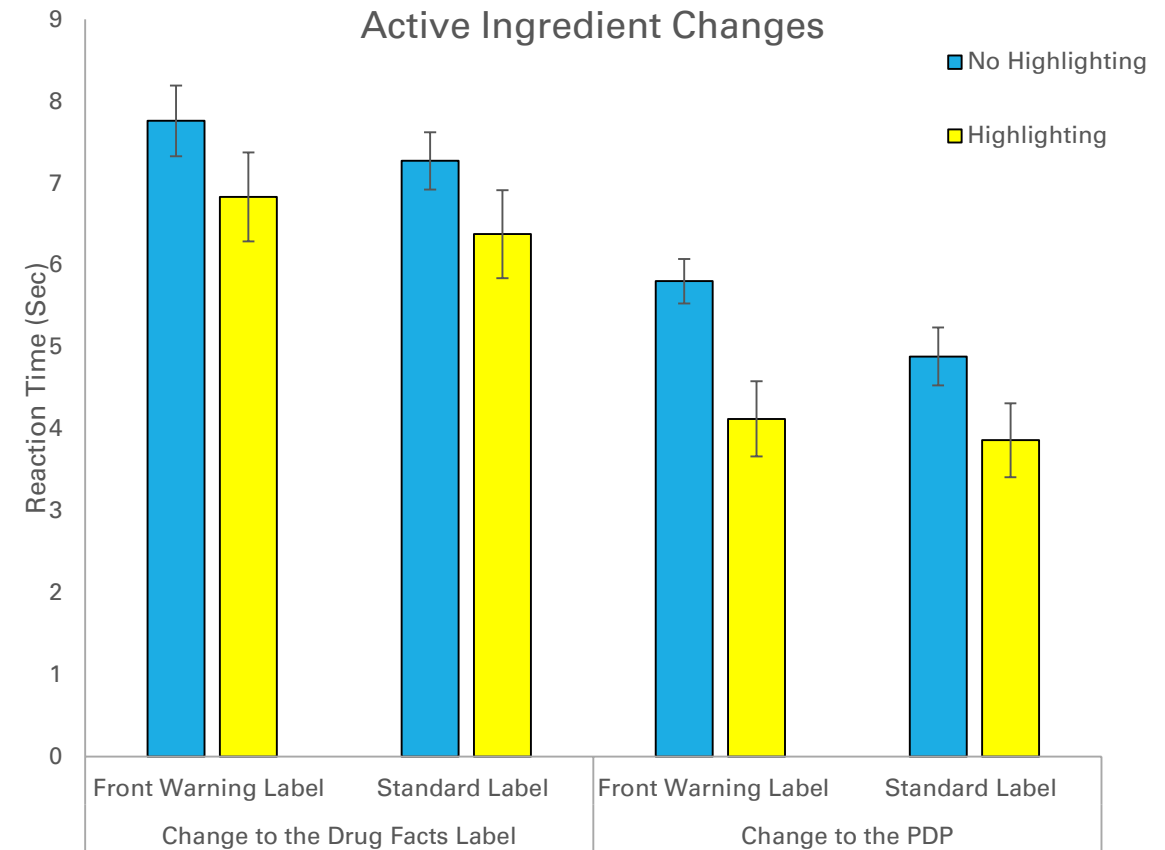
Subjects: 60 Adults 65+

Method: Change Detection

- Requires attention (Rensink, O'Regan, & Clark, 1997).
- Time to detect a change indexes when attention first reaches the changing information (Becker, et al., 2015; Simons & Rensink, 2005).
- Does **not** require telling participants to look for warnings or active ingredients.

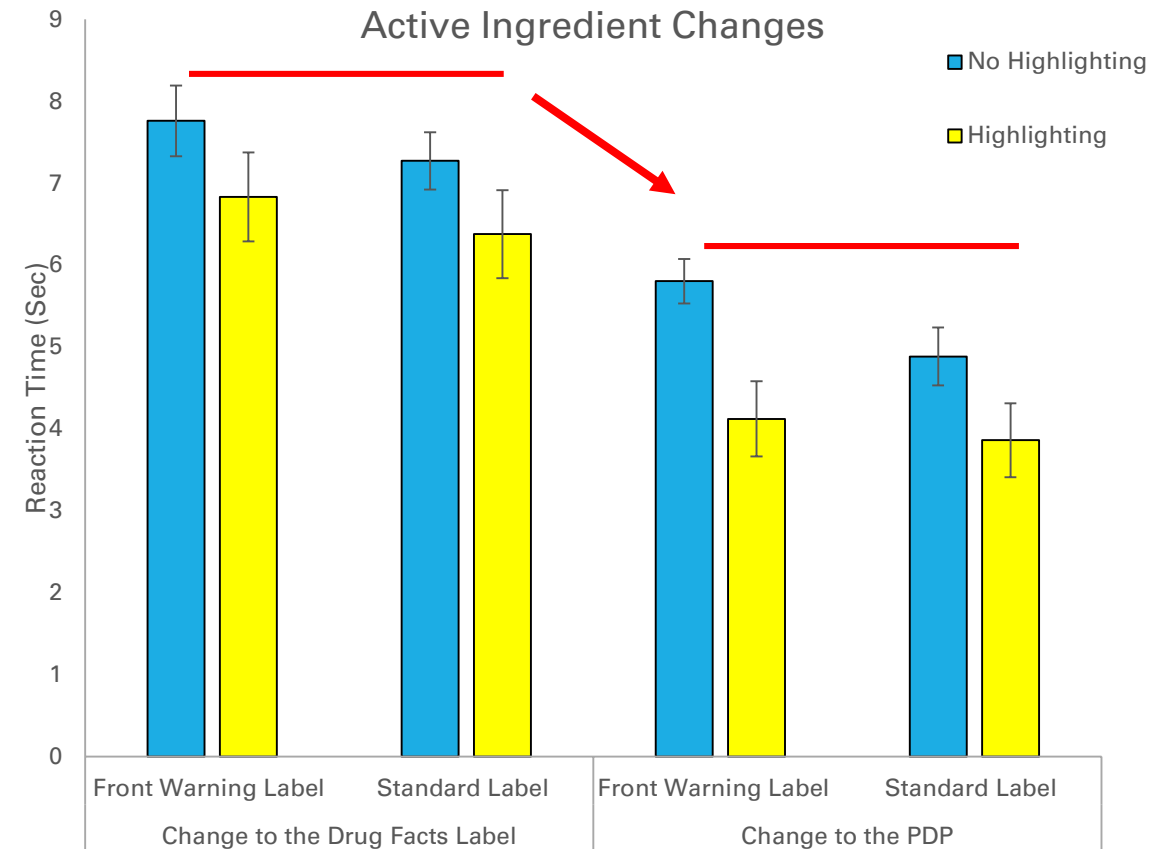


# Active Ingredients



# Active Ingredients

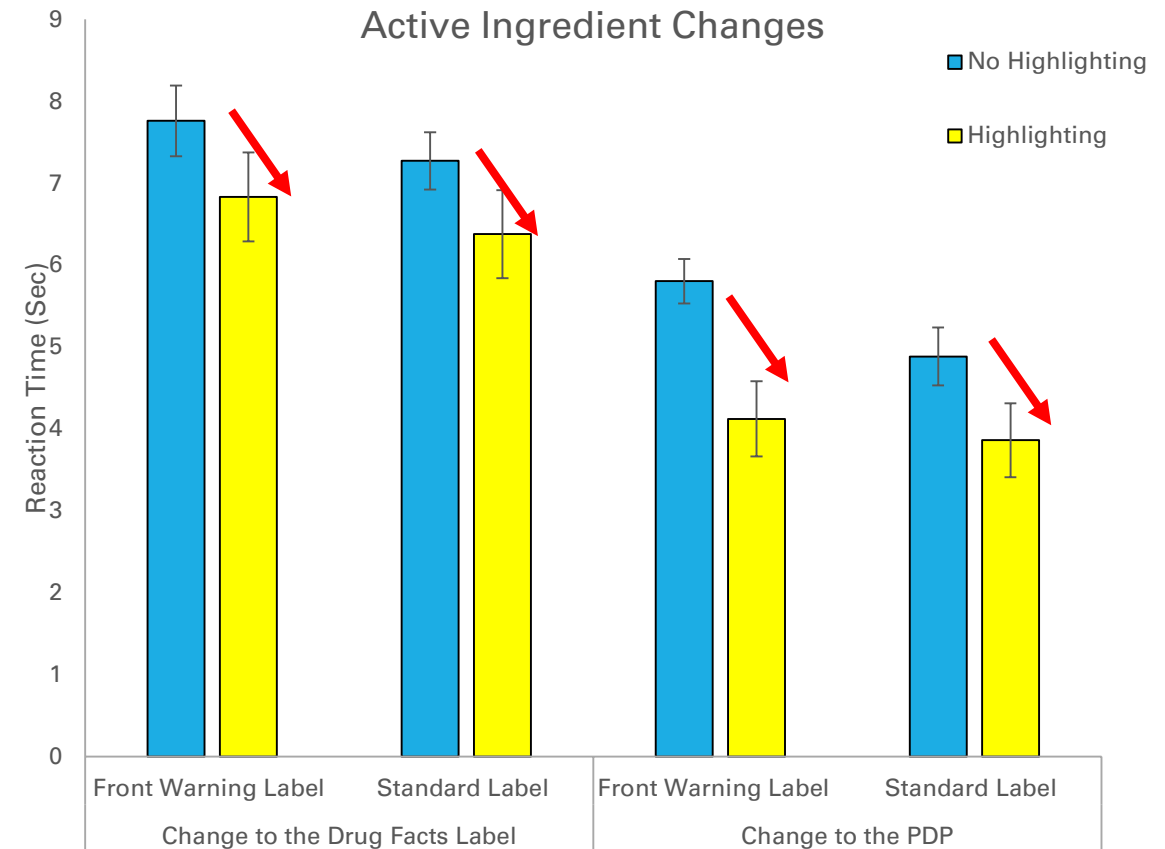
Changes detected more quickly on the PDP than on the Drug Facts Label,  $F(1, 435)=75.3, p<0.001$



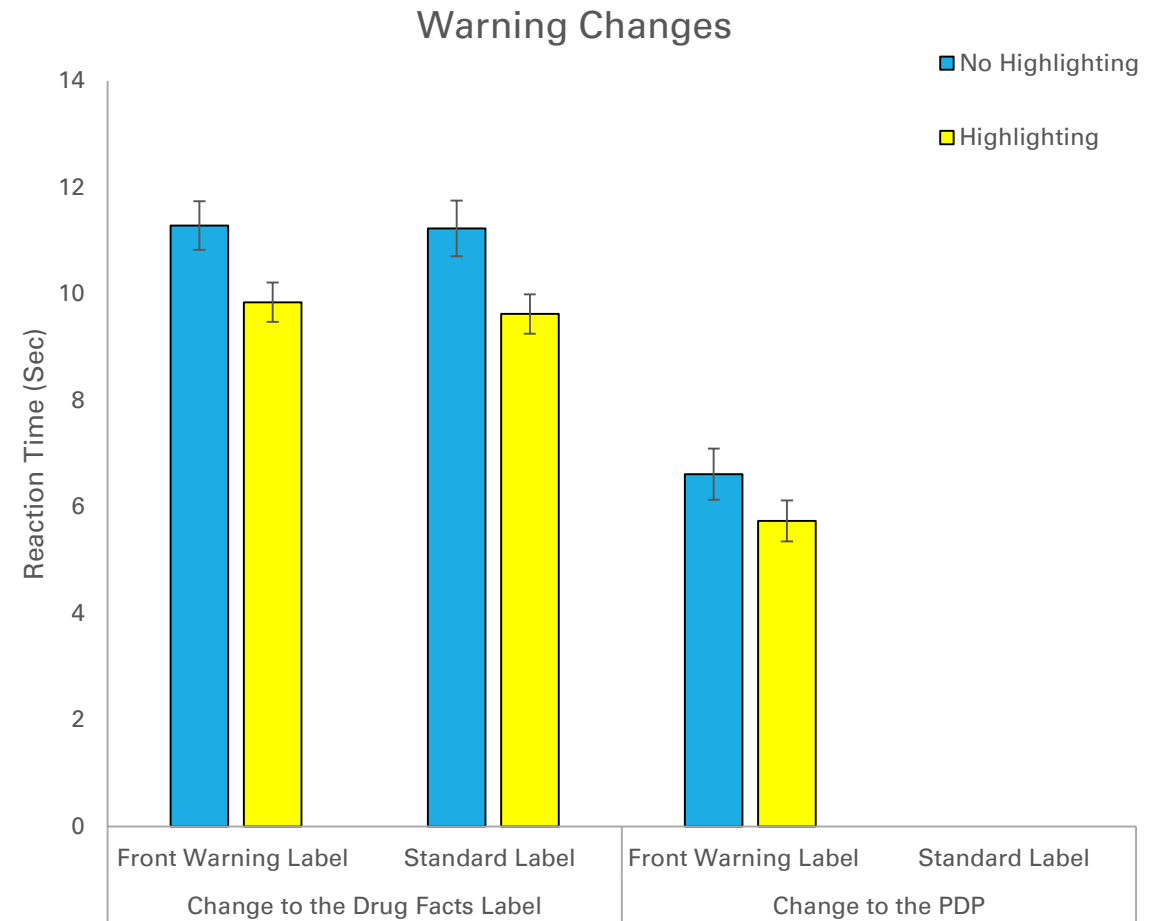
# Active Ingredients

Changes detected more quickly on the PDP than on the Drug Facts Label,  $F(1, 435)=75.3, p<0.001$

Highlighting produced faster change detection,  $F(1, 422) = 16.17, p < 0.001$ .

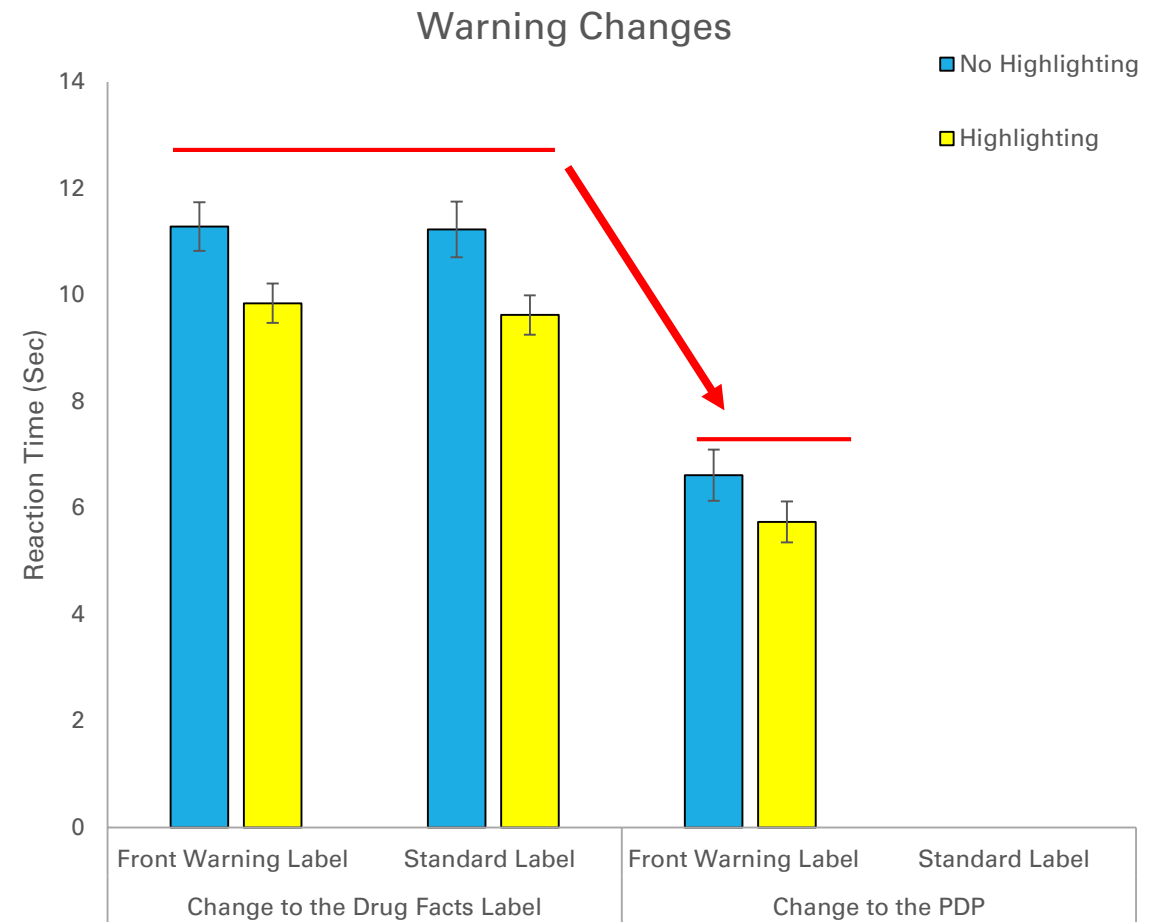


# Warnings



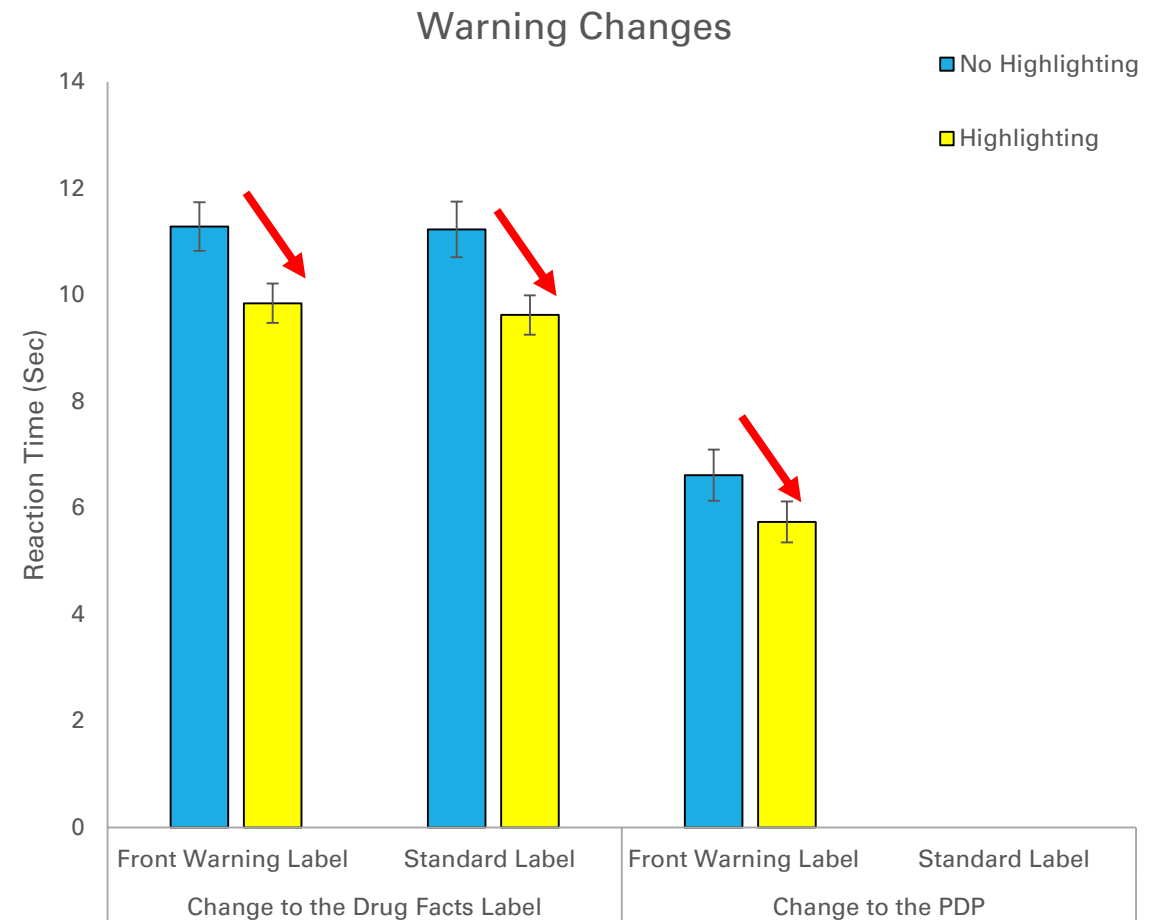
# Warnings

- Changes detected more quickly on the Front Warning Label than on the Drug Facts Label,  $F(2,448)=142.733$ ,  $p < 0.001$ .



# Warnings

- Changes detected more quickly on the Front Warning Label than on the Drug Facts Label,  $F(2,448)=142.733$ ,  $p < 0.001$ .
- **Highlighting produced faster change detection,  $F(1,453) = 11.676$ ,  $p = 0.001$ .**





# Summary of Experiment 1- Change Detection

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- Highlighting increased attention to critical information.
- People preferentially attend to information on the PDP.
- Placing warnings on the PDP increased attention to them.

Will these labels allow people to better use critical information?

# Experiment 2: Use of Warning Information

**Subjects:** 68 Older Adults (65+).

**Stimuli:** Same 2 x 2 labels.

**Task:** Make a Yes/No response to a scenario that requires accessing warning information.

Should this medication be avoided by someone using a prescription for Parkinson's disease?

Actual Size 150 Coated Tablets

**Drug Facts**  
**Active ingredient (in each tablet)** Naproxen sodium, 220 mg (naproxen 200 mg) NSAID\* nonsteroidal anti-inflammatory drug  
**Purpose** Pain reliever/Fever reducer

**Uses**  
temporarily relieves minor aches and pains due to:  
toothache ■ menstrual cramps ■ backache  
headache ■ the common cold ■ muscular aches  
minor pain of arthritis ■ temporarily reduces fever

**Warnings**  
**Allergy alert:** Naproxen sodium may cause a severe allergic reaction, especially in people allergic to aspirin. Symptoms may include:  
hives ■ facial swelling ■ asthma (wheezing) ■ shock  
skin reddening ■ rash ■ blisters. If an allergic reaction occurs, stop use and seek medical help right away.  
**Stomach bleeding warning:** This product contains an NSAID, which may cause severe stomach bleeding. The chance is higher if you:  
are age 60 or older  
have had stomach ulcers or bleeding problems  
take a blood thinning or steroid drug (anticoagulant)  
take other drugs containing prescription or nonprescription NSAIDs (aspirin, ibuprofen, naproxen or others)  
have 3 or more alcoholic drinks every day while using this product  
take more or for a longer time than directed  
**Heart attack and stroke warning:** NSAIDs, except aspirin, increase the risk of heart attack, heart failure, and stroke. These can be fatal. The risk is higher if you use more than directed or for longer than directed.  
**Do not use**  
if you have ever had an allergic reaction to any other pain reliever/fever reducer ■ right before or after heart surgery

**Ask a doctor before use if** ■ the stomach bleeding warning applies to you ■ you have problems or serious side effects from taking pain relievers or fever reducers ■ you have a history of stomach problems, such as heartburn ■ you are taking a diuretic ■ you have high blood pressure, heart disease, liver cirrhosis, or kidney disease ■ you have asthma

**Drug Facts (continued)**  
**Ask a doctor or pharmacist before use if you are**  
taking any other drug  
under a doctor's care for any serious condition

**When using this product**  
take with food or milk if stomach upset occurs

**Stop use and ask a doctor if** ■ you experience any of the following signs of stomach bleeding: ■ vomit blood ■ feel faint ■ have bloody or black stools ■ any new symptoms appear ■ have stomach pain that does not get better ■ pain gets worse or lasts more than 10 days ■ fever gets worse or lasts more than 3 days ■ redness or swelling is present in the painful area

**If pregnant or breast-feeding,** ask a health professional before use. It is especially important not to use naproxen during the last 3 months of pregnancy unless definitely directed to do so by a doctor because it may cause problems in the unborn child or complications during delivery.  
**Keep out of reach of children.** In case of overdose, get medical help or contact a Poison Control Center right away.

**Directions**  
do not take more than directed ■ the smallest effective dose should be used ■ drink a full glass of water with each dose  
adults and children 12 years and over: take 1 tablet every 8 to 12 hours while symptoms last ■ for the first dose you may take 2 tablets within the first hour ■ do not exceed 3 tablets in a 24 hour period ■ children under 12 years: ask a doctor

**Other information**  
each tablet contains: sodium 20 mg  
store at 20°-25°C (68°-77°F) high humidity and excessive heat above 40°C (104°F)  
see end flap for expiration date and lot number

**Inactive ingredient** FD&C blue #2 lake, hypromellose, magnesium stearate, microcrystalline cellulose, polyethylene glycol, povidone, talc, titanium dioxide

**Questions or comments?**  
Call 1-800-395-0889 (Monday - Friday 9AM- 5PM EST)

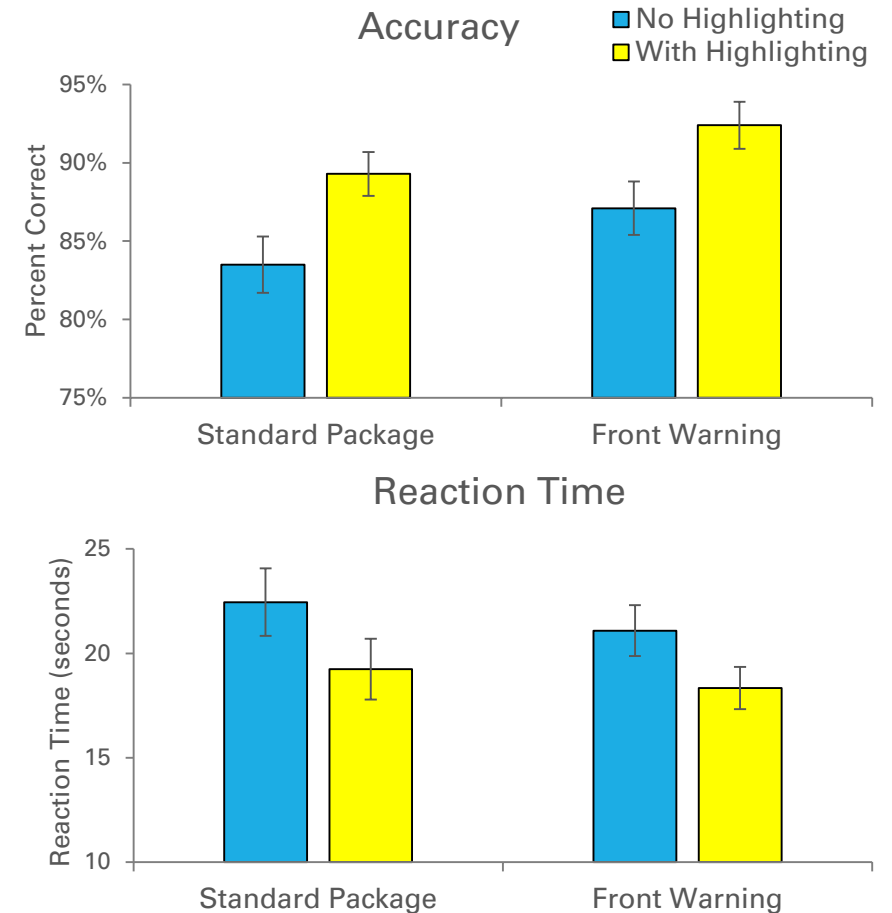
Please press the "M" key to respond "Yes" and the "Z" key to respond "No."

# Key findings –Correct ID of Problematic Drug

Both Highlighting ( $p < .001$ ) and Front Warnings ( $p = .012$ ) produced higher accuracy.

Faster with highlighting ( $p < .001$ ) and numerically faster with warnings (n.s.).

Ideal Result: Faster and more accurate with highlighting and front warnings.



# Summary of Data

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There is a consensus that information about Drug/Drug and Drug/Diagnosis warnings are important to the reduction of ADRs in older adults.

Putting these warnings into a front-of-pack warning increased attention to that information (Chane Detection Experiment) and increased the speed and accuracy of using that information (Absolute Judgement).

Highlighting critical information (warnings and active ingredients) also appears to increase attention and allow better use of it.

# Future experiment

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Eye tracking while participant judge whether an OTC is appropriate for them, given their health history.

Assess how novel labels influence attention and, in turn, support appropriate OTC decisions.

Will have 3-d displays (so may produce even larger effects).

# Conclusion: Labels Could Be Improved

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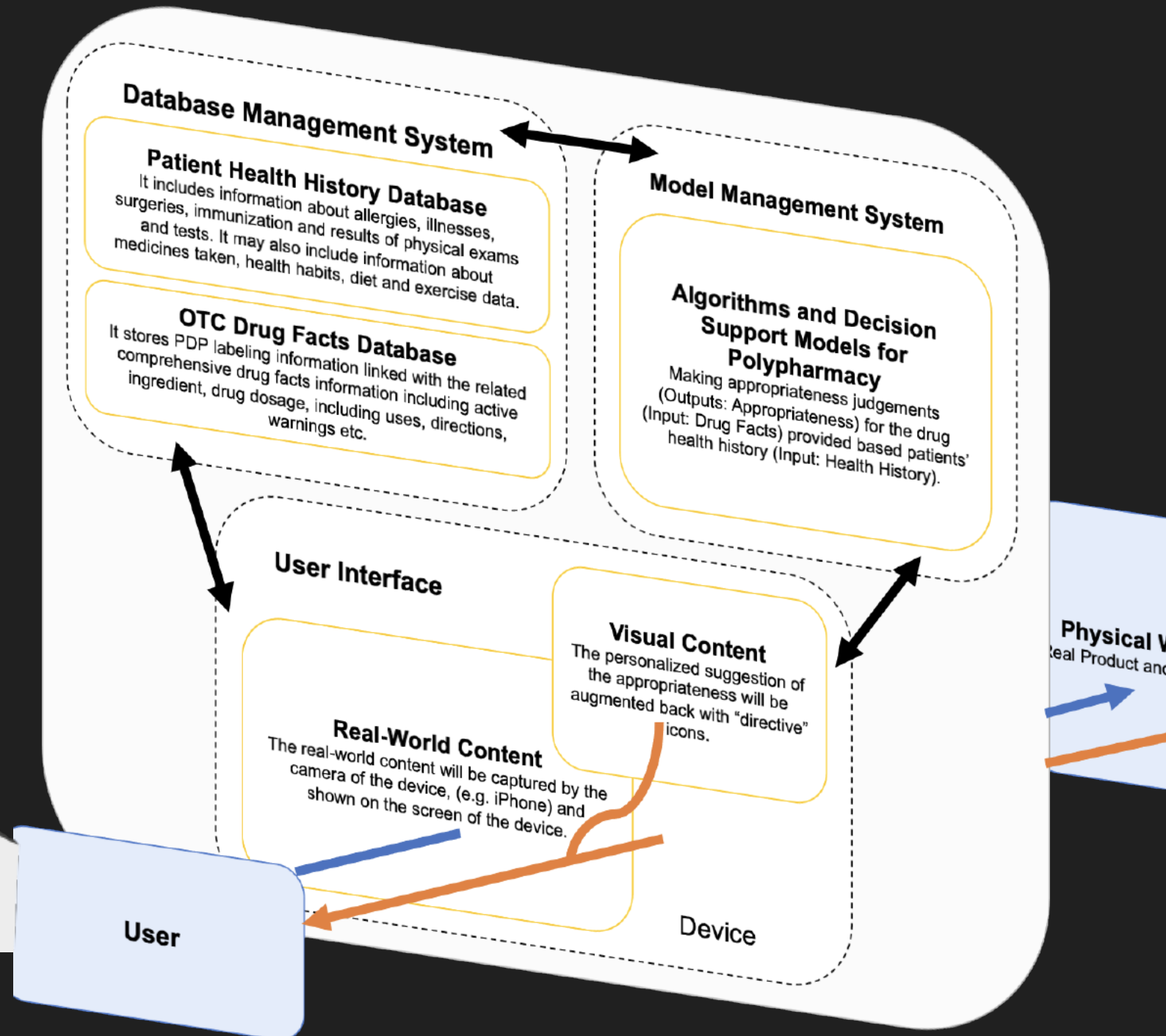
- Highlight critical information
- Front-of-Pack warnings (drug-drug/drug-diagnosis warnings)
- Increases early processing (attention) and usability of critical information – may reduce ADRs

# However....even with an ideal label there are challenges

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- **Human Errors:** People still need to make good decisions; they need to know/remember what active ingredients they currently take, their diagnoses, and need to comprehend the information.
- **Label Issues:** The way labels work, to find an appropriate OTC requires the search for an absence of information.
  - If I have diabetes, I am looking for an OTC with no warning about diabetes
- Searches for the absence of information are known to be slow and problematic.

# Approach 2: Augmented Reality.







Safe to Use for You. 

**50% MORE**

**VICK'S**

**NyQuil**

**COUGH**

Chlorpheniramine, Dextromethorphan  
 • Soothing, Buzzy Nausea  
 • Cough

Nighttime Cough Relief

12 FL OZ (355 mL)

Drug Interaction Risk

**TopCare**

SEE NEW WARNINGS INFORMATION

EXTRA STRENGTH • NON-HABIT FORMING

**Pain Relief PM**

ACETAMINOPHEN / DIPHENHYDRAMINE HCl

• Pain Reliever • Nighttime Sleep Aid

50 CAPLETS

High Risk for You! 

**Advil**

Ibuprofen Tablets, 200 mg

Pain Reliever / Fever Reducer (NSAID)

Tablets

4 COATED TABLETS

**DrugStore**

Drug Interaction Risk

See New Warning

**TYLENOL**

PM

Acetaminophen

100 CAPLETS

# Stay tuned

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- Mark Becker  
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