

A Computer Assistant Support of Diabetes Self-Care and Improvement of Health Literacy

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Diabetes

246 million people worldwide

20 million in the United States

Cost in the US: \$132 billion

Other countries are equally impacted

- China: 41m diabetics
- India: 39m diabetics
- Russia: 10m diabetics

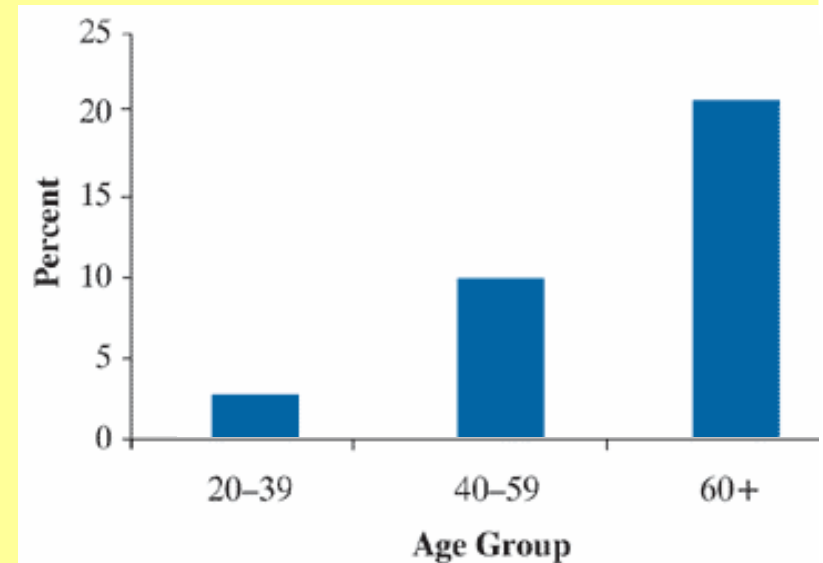
American Diabetes Association, 2002

Older Adults

Older adults more prone to diabetes type II

- Organ functioning decline
- Physical activities become challenging

20% of individuals over 60 have diabetes



Diabetes by age group

Diabetes Type II



Lydia (aged 62) experiences increased thirst, frequent urination at night, fatigue, and blurred vision

She visits her physician who sends her to the clinic. Test results indicate that she suffers from **diabetes type II**

The physician prescribes her a treatment, which exists of a number of **complex tasks** including: performing exercise, maintaining a healthy diet, and taking medication.

Key issues for Lydia are **learning self-care tasks** and combining them with her daily routines while maintaining a good quality of life



Computer Assistants for Supervision of Older Diabetics' Self-Care

Computer assistant

- Monitors self-care
- Provides feedback

Goals to improve

- Health literacy
- Medical adherence



Computer Assistant Feedback Styles

Assistant and User Characteristics

	Cooperative Feedback Style	Directive Feedback Style
Assistant	Coaching Educating Advising Oriented towards satisfaction and long-term development	Directing Reporting Dictating Oriented towards quick problem solving
User	High participation level Committing	Low participation level Complying

Computer Assistant Feedback Styles

Advantages and Disadvantages

	Cooperative Feedback Style	Directive Feedback Style
Advantages	<p>Learn new competencies and develop understanding</p> <p>Better performance in long-term</p> <p>User-assistant complementing</p>	<p>User needs few competencies</p> <p>Better performance in short-term</p> <p>Vigorous acting due to expert assistant</p>
Dis-advantages	<p>Assistant support can become tedious and patronizing</p>	<p>Vulnerable to mistakes when participation is required</p> <p>User loses idea of control</p>

Computer Assistants for Improvement of Health Literacy

Computer assistant feedback

- Different situations
- Different feedback styles

Adaptive computer assistant

Does an adaptive computer assistant contribute to health literacy of older diabetics?

Computer Assistant for supervision of older diabetics' self-care

Adaptive computer assistant

Patient Situation

- Normal
- Health-Critical

Assistant Type

- Fixed
- Adaptive

	Patient Situation	
	Normal Situation	Health-Critical Situation
Assistant Type	Cooperative feedback style	Cooperative feedback style
	Adaptive	Directive feedback style

Smart Home Laboratory

Georgia Tech AwareHome

Home like atmosphere for
easy assessment of
natural behavior

Addresses independent living
fundamentals

- Technical
- Design
- Social challenges



Method

Design

28 older adults

8 Scenarios

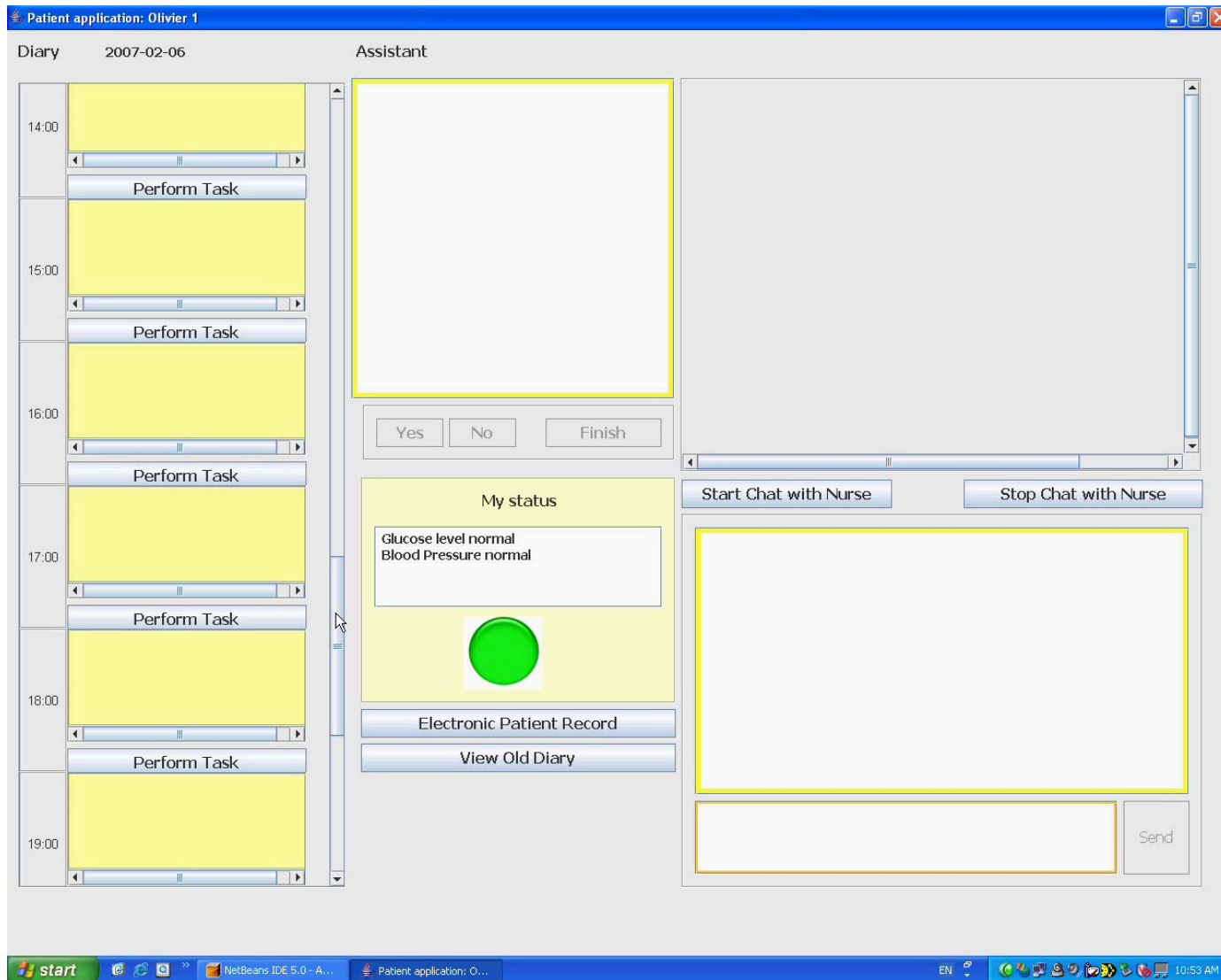
- Within design
- 4 Fixed, 4 Adaptive
- Patient situation varies from normal to health-critical

Dependent variables

- Preference for assistant type
- Diabetes knowledge

Method

Adaptive computer assistant



Method

Adaptive computer assistant

The screenshot displays a software application window titled "Patient application: Olivier 1". The interface is divided into several sections:

- Diary (Left):** A vertical timeline for the date 2007-02-06. It shows time slots from 12:00 to 18:00. Each slot contains a "Perform Task" button. At 17:00, a text box displays: "Symptom: blurry vision", "Symptom: sweating", and "Glucose: 3 mmol/L".
- Assistant (Middle):** A central panel with a yellow border containing text: "You are experiencing: *A minor glycemc attack", "To improve your health situation, I have the following suggestion:", and "Please check the box next to which solution you have followed and when done press the Finish button." Below this text are "Yes", "No", and "Finish" buttons. A "My Status" section shows "Minor Hypoglycemic Attack" with an orange circle icon. At the bottom are "Electronic Patient Record" and "View Old Diary" buttons.
- Right Panel:** Contains a checkbox labeled "Drink some sugarwater". Below it are "Start Chat with Nurse" and "Stop Chat with Nurse" buttons. A large white area is reserved for a chat window, with a "Send" button at the bottom right.

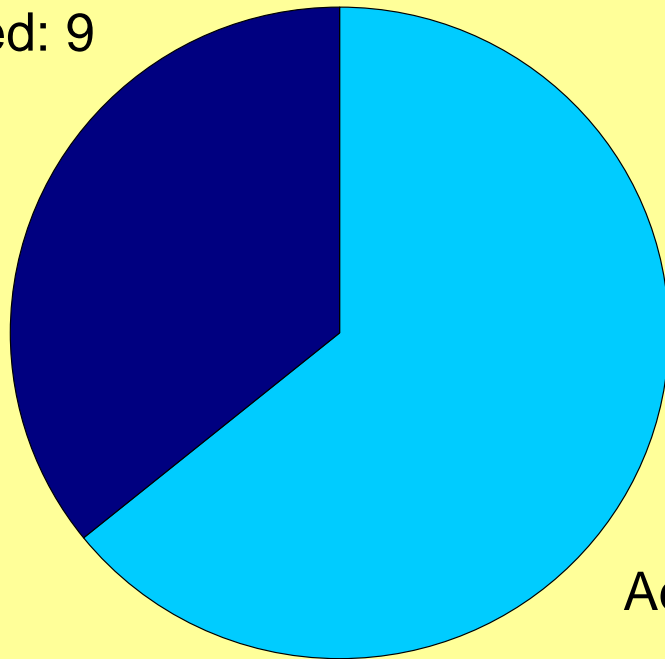
The Windows taskbar at the bottom shows the "start" button, "NetBeans IDE 5.0 - A...", and "Patient application: O...". The system tray on the right shows the language set to "EN" and the time as "10:53 AM".



Results

Satisfaction measured by Preferences for a Fixed or Adaptive Assistant

Fixed: 9



Adaptive: 17

Majority prefers the adaptive computer assistant

Questions diabetes questionnaire

Survey to assess diabetes knowledge

Halfway (Q1) and at the end (Q2) of experiment

- Q1 and Q2 were identical
- 8 multiple-choice questions

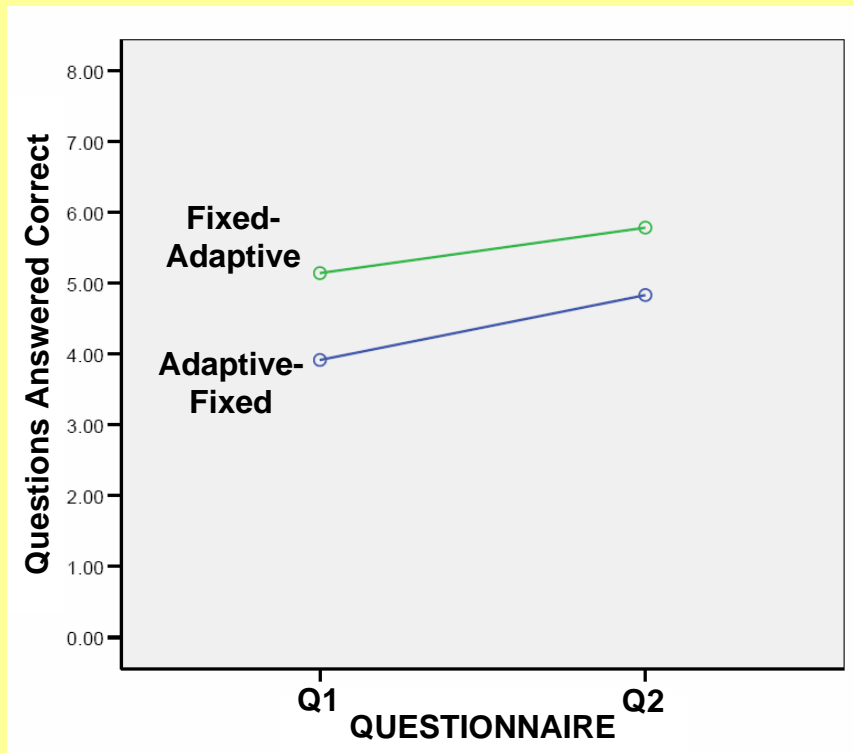
Examples:

If your glucose level is too low, which symptoms will you experience?

The best way to prevent hyper- and hypoglycemic attacks is by?

Results

Educational Value Measured by Increases in Diabetes Knowledge



The assistant types did not influence the growth of diabetes knowledge

Growth of diabetes knowledge with the use of computer assistant

Discussion

Preference for adaptive assistant

General increase in knowledge of diabetes, regardless of assistant type

Future directions

- Actual diabetes patient
- Field study

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- www.tno.nl

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- www.awarehome.gatech.edu

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Questions?

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