Designing Technology to Improve Health and Wellness

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Overview

General introduction to research agenda

Computing systems can **address fundamental problems** in chronic care management and developmental disabilities

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General Introduction to Research Agenda

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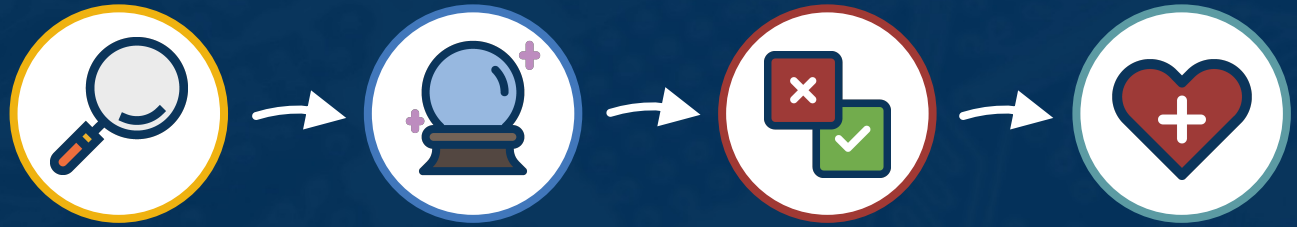
Study human thoughts, perceptions, and behavior

Science is the method of choice:



Make Observations → Make Predictions → Test predictions → Develop intervention to improve the human condition

Use theories to drive research

Background in Psychology

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Human Computer Interaction (HCI)

- The study of how **people interact with "computers"**
- **Focus:** design and deploy systems that are **useful, usable, and enjoyable**
- Allow users to **meet their goals**

Human Centered Computing at GT

- Move **beyond the dyad** of human and "computer" to broader understanding of **how computational artifacts effect human experience and culture**
- Focus on **sociotechnical systems**

Role as Computer Scientist

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Methods: User Centered Design

1. **Need Assessment**
2. **Design ideation**
3. **Prototyping**
4. **Evaluation**

Contributions: Pragmatic or Futuristic

- **Build:** Novel interactions, interfaces, and systems
- **Ideas:** design implications and guidelines

Where do HCI and Psychology meet?

Scale human effort over **time and space**

Allows clinicians to **reach many people**

Propose **theories** that can be **helpful to HCI**

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Research Premise

Human Centered Computing can **improve the human condition**

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Why HCI for Health?

Health spending accounts for **17.8% of GDP**

By 2025 it will **increase to 20.1%**

Chronic disease leads to 7 of 10 deaths each year.

-CDC

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Design technologies that **bridge major gaps** in **chronic care management** and **improve wellness:**

Engage the “user”

Current treatment and practices

Bridge gaps in continuity of care

What happens between visits to providers, such as physicians, therapists, and clinical psychologists

Mediate communication at point of care

What does the care provider want to know & self-advocacy

Design Systems that Support Diverse Stakeholders

- **Individual, families, professionals, clinicians, and researchers**
- Based on **ubiquitous interfaces** (cell phones, social media, web)
- **Different needs:** physical health, wellness, mental health

Collaboration with Domain Experts is Key

- Understanding the user is central to **user centered design (UCD)**

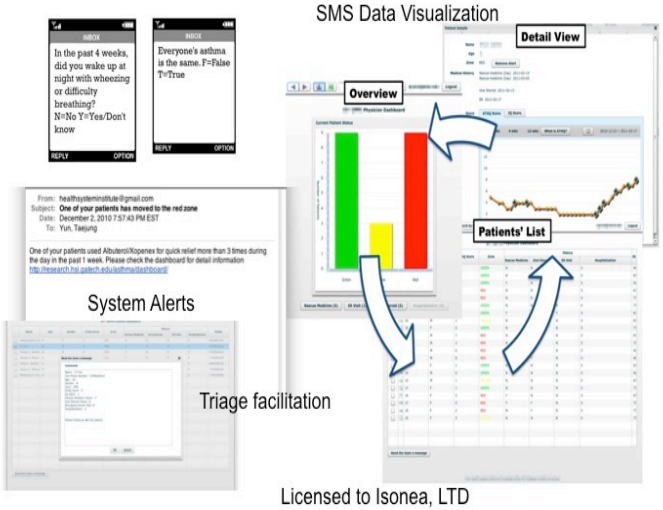
Digital Asthma Action Plan

Augmented Reality Educational Game

CHOA

Patient-Centered Continuous Access System (P-CCAS)

Asthma, Diabetes, Congenital Heart Disease



Emory Hospital

Developmental Milestone Research

Phone App

Over 700k downloads!

Medical Center

Fruitful Collaborations

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Chronic disorders: must last more than 1 year **and:**

a) Lead to **limitation of function**, activities or social role

and/or

b) Dependency on medication, special diet, assistive technology, etc.

and/or

c) Require medical, educational, psychological services beyond what is expected for an age mate.

Research Domain: Developmental Disability

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Characterized by **difficulties** in **socialization, sensory sensitivities, communication, restricted interests,** and **repetitive behavior**

- **About 1 in 68 children diagnosed in US**
  - 1:42 boys vs 1:189 girls
- **Spectrum**
  - **Level 3:** require most support
    - minimal language and mental impairments
  - **Level 1:**
    - Normal language, IQ
    - Mostly social skills deficits
    - **Improve wellness**

US Autism Population Estimate
as of 2007 (ages 3-22)
237,462

US Annual Economic Cost
$7,123,880,989

Next Diagnosis in **6:56 mins**

Data from www.FightingAutism.org

Autism

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Using Computing Systems to Address Problems in Chronic Care Management

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Designing Systems to Increase Awareness of Tracking Developmental Milestones

- Milestones are **cognitive, motor, emotional skills** that children acquire in a **specific timeline**
- Not meeting these milestones can **signal developmental delay**
- The sooner children are identified as having delay the **sooner they can get intervention they need**
- The **CDC** had a paper-based program on **developmental milestone tracking**

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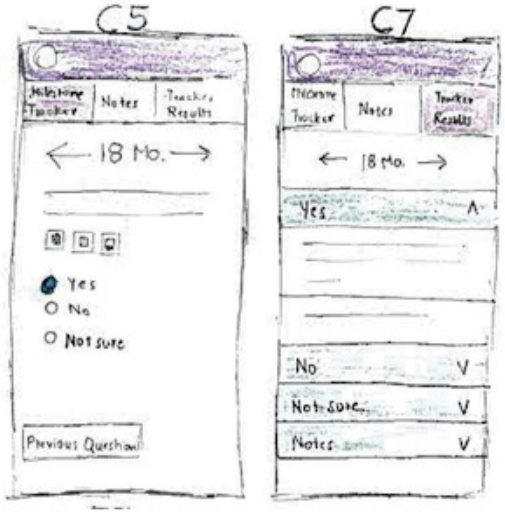
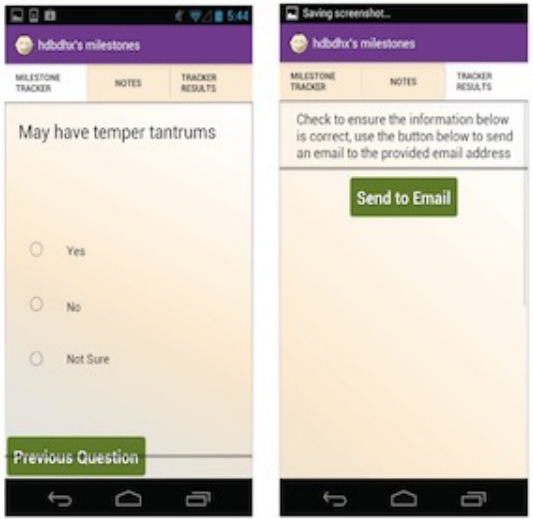
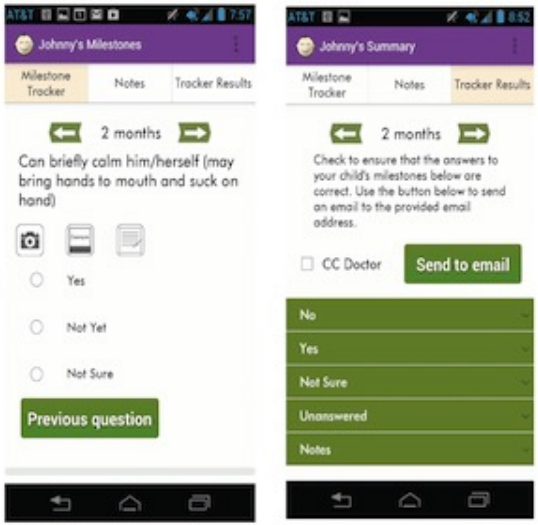
Develop an **interactive proof-of-concept prototype** for **tracking developmental milestones** using existing **"LTS.AE" materials**



Paper Mockup



10/2012



12/2012

First Study with CDC

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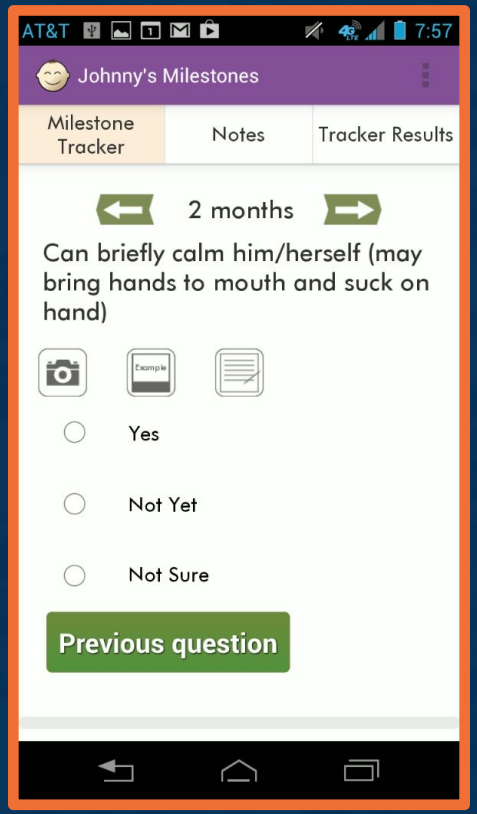
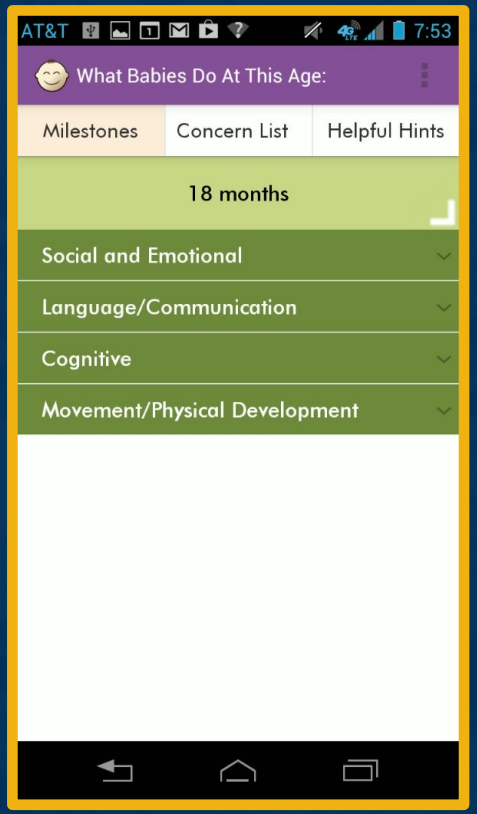
Personalized



Non-Personalized



App Usage

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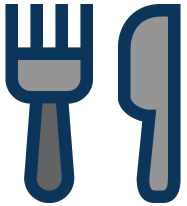
WIC & GT Collaboration:

Children in **low socioeconomic (SES) families** are less likely to receive **early intervention**

Past CDC interviews had **high SES families**



WIC provides **nutritional education** and is looking to **expand its services** to include **education about children's development**

Goals:

Reach **low SES families** and **children**

Work with families of **different language** and **racial backgrounds** within this demographic

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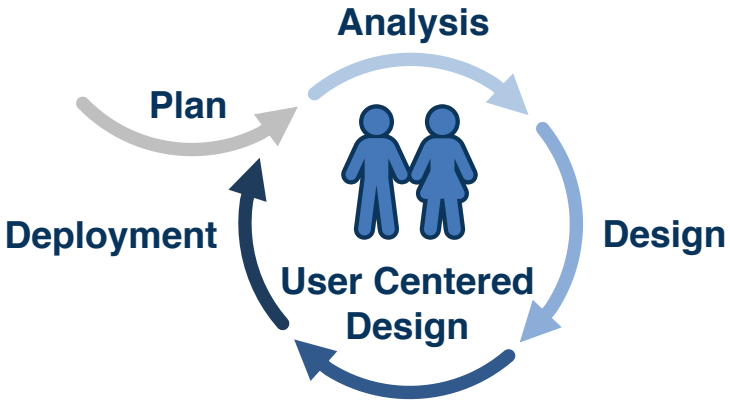
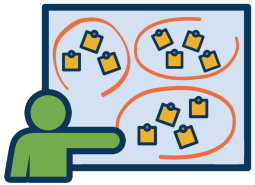
Contextual Inquiry

Interview





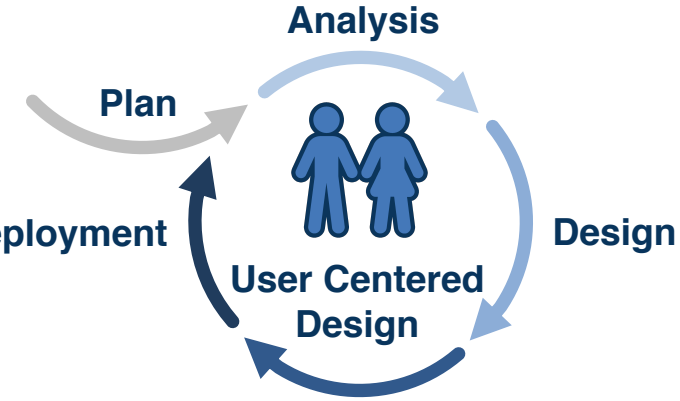
Affinity Diagramming

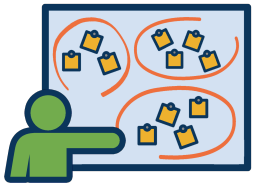
Personas

- Interview WIC parents
- Review transcripts to find parents' attitudes towards technology & children's development

Contextual Inquiry

Interview





Affinity Diagramming

Personas

- Knowledge about Developmental Milestones
- Use of technology (general use)
- Use of technology (for learning about children's health & development)
- Experience with the WIC program

Interview Topics

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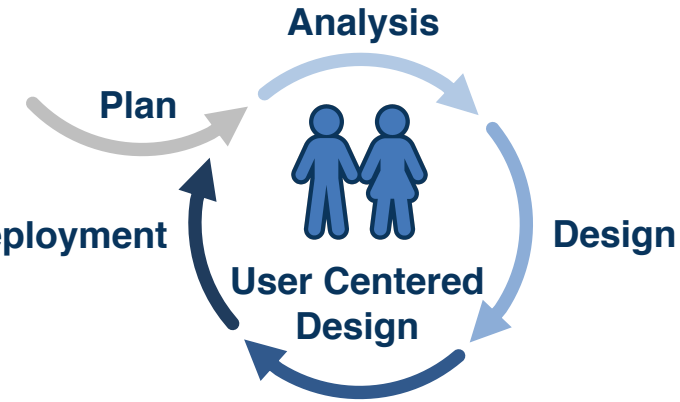
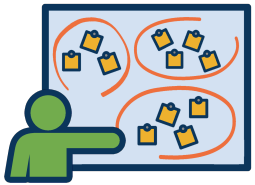
Contextual Inquiry

Interview





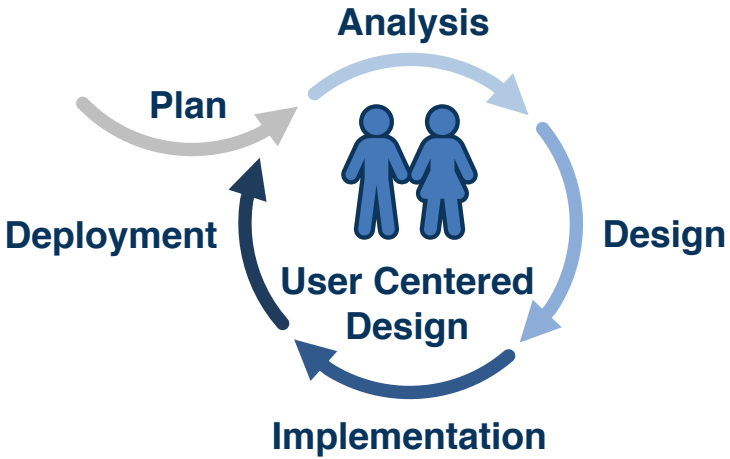
Affinity Diagramming

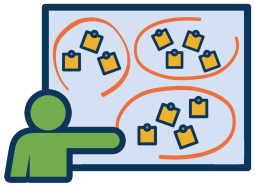
Personas

- ~2 out of 51 parents “knew” the term “developmental milestones”

Contextual Inquiry

Interview





Affinity Diagramming

Personas

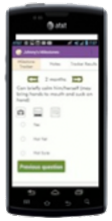
Defined **developmental milestones**

Probed their **knowledge of developmental milestones** by introducing **various ways** that these could be **accessed by technology**

Used 5 interfaces:

Booklet

Website



Phone App

Kiosk

Text Message

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	Smartphone	Tablet	Laptop	Desktop
African American N=24	21	16	18	7
White N=6	5	2	2	3
Hispanic N=21	15	3	8	4
All Clients N=51	41	21	28	14

Technology Usage

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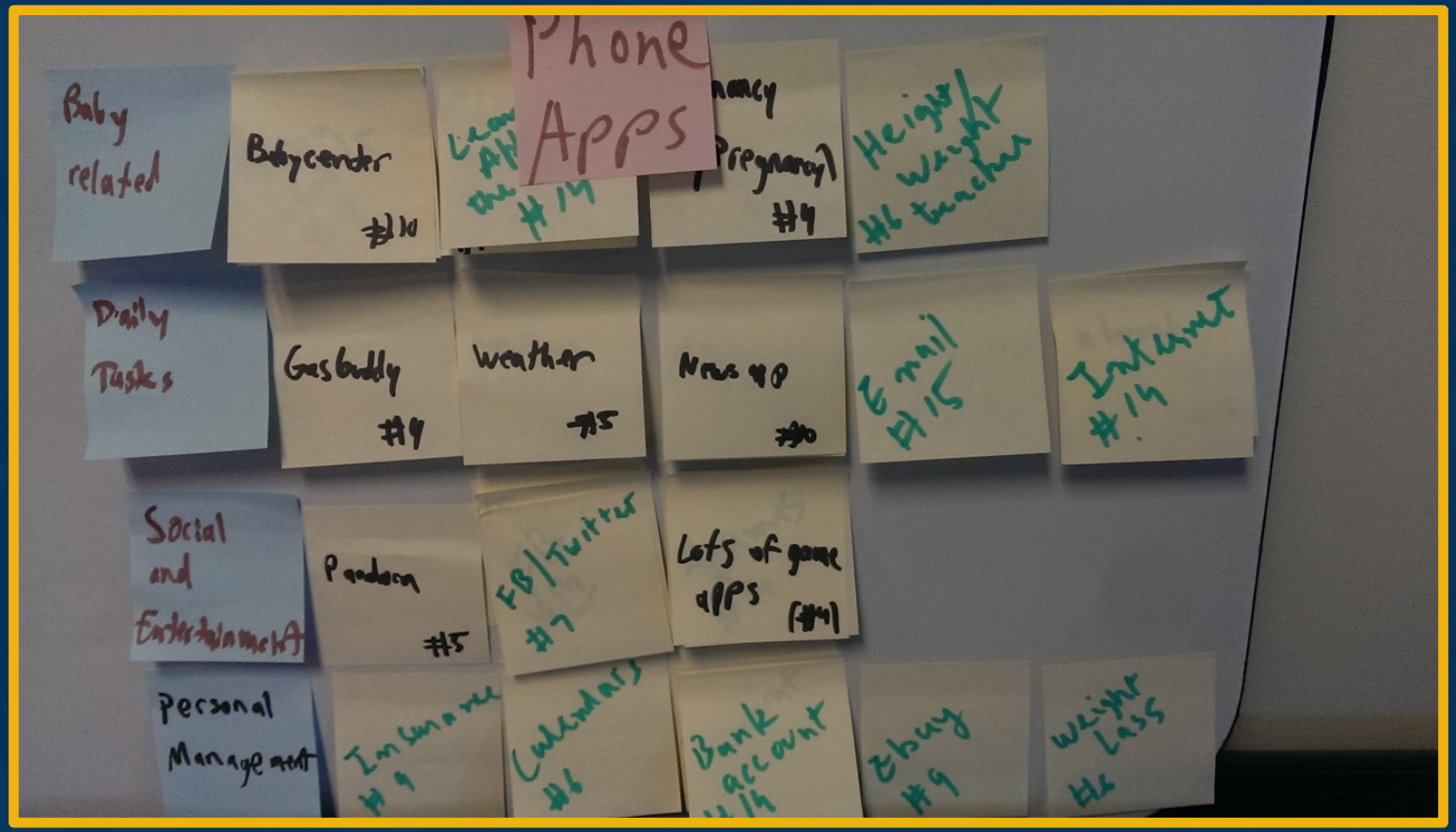

App Usage

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N = 51

Convenience: Access to content & ease of use (16 parents)

Security (19 parents)

Learning or Bonding (19 parents)

	1st Choice	2nd Choice	3rd Choice
Convenience (16)	Website	App	Booklet
Security (19)	App	Website	Text
Learning or Bonding (16)	App	Website	Booklet/Text

Interface Preference by Values

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You are not the expert:

Partner with people that are experts

You are not your "user":

You have skills & experience that effect the way you perceive needs

"Design is an evidence based & systematic process":

Follow human-centered design approach

Free Coursera GT Course:

Google search: Arriaga User Experience (enrollment over 230K and 4.5 stars)

David Muñoz and Rosa I. Arriaga. 2015. ***Low-Income Parents' Values Involving the Use of Technology for Accessing Health Information.*** *In 15th IFIP TC 13 International Conference on Human-Computer Interaction --- INTERACT 2015 - Volume 9298. Springer-Verlag, Berlin, Heidelberg, 53–70. DOI:* ***https://doi.org/10.1007/978-3-319-22698-9_5***

Link to Paper

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