User-supplied textual passwords used today have significant problems:
1) Hard to remember, 2) Easily guessed, 3) Reused at many servers.
There is inherent tension between memorability and guessability of passwords – humans do not easily create new memories and do not retain them well.

We propose Life-Experience Passwords (LEPs). Users create passwords based on facts they remember about past events from their life. LEPs provide the following benefits to end users:
1) Easy to remember: facts and events are already in user’s episodic memory
2) Hard to guess: details of memorable events are unique and difficult for others to guess
3) Abundance of memories: humans have many personal experiences to use.

**Sample User Story for Free Form Input**

User story: When I was seven, my family traveled to our first vacation abroad. We went to Paris and visited Louvre and Versailles. We traveled with my cousins Paul and Laura. We also visited friends Marie and Jacques in Paris. We took a trip with TGV to Geneva, a fast train that I loved.

**Association Keyword:** First vacation abroad

- Q: Where did you go? A: Paris
- Q: Where did you visit? A: Louvre, Versailles
- Q: Who did you travel with? A: Paul, Laura
- Q: Who did you visit also? A: Marie, Jacques

**Sample Story for Prompted Input**

**Learning Category**
- Q: What did you do? A: Learned snowboarding
- Q: When was it? A: 2001
- Q: Where was it? A: Snoqualmie pass
- Q: Who were you with? A: my girlfriend

**Feasibility Study**
- Data Sets: Initially gathered short personal stories from 10 users, where each user provided 4 different stories
- 70% of answers were supplied correctly
- Hobbies and feelings have low recall rates

**Issues/Challenges**
- Detecting Synonyms: Father vs. Dad vs. John
- How much user guidance
- How to obtain the right amount of personal info
- How to provide enough context: jog memory but do not reveal answers
- Can someone use social network/data mining to guess answers

**Future Work**
- Improve NLP algorithms
- Explore psycholinguistic aspects

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**LEPs with Free Form Input (Approach 1)**

1. Ask users to provide their personal short stories (2-3 sentences) in the following categories:

- **#1 Life Time Story (Type 1):** Story about a specific event in a user’s life that was memorable: e.g., a birthday, a vacation trip, memories from high school, college, work events, a graduation, a funeral, a wedding …

- **#2 Flashbulb Story (Type 2):** Story about the circumstances/the moment when a user heard surprising and consequential news (e.g. about 9/11, the death of Princess Diana, the 2004 World Series win by the Boston Red Socks, Hurricane Katrina etc.)

- **#3 First time learning (or doing) Story (Type 3):** Story about learning or doing something for the first time. E.g. What did a user learn, where, who taught him, did something memorable happen, etc.

2. Extract keywords from user provided stories based on Named Entities, and *Where*, *When*, *Who* and *What* information (Store keywords only)
3. Auto-generate authentication questions tailored to specific users based on keywords
4. When user wants to authenticate, prompt them with appropriate questions about these keywords

**LEPs with Prompted Input (Approach 2)**

1. Ask users to provide short answers to prompts that are fixed and belong to the categories:
   - **Learning** (riding, biking, swimming, ice skating, skiing, snowboarding, paragliding)
   - **Location** (visiting a certain place)
   - **Person** (an event about a person from user life)
   - **Lifetime** (death, wedding, engagement, graduation from high school, graduation from college, prom, job)
   - **Flashbulb** (9/11, Hurricane Sandy, Earthquake)
2. For authentication, users are simply asked to provide same answers to prompt questions