Public-Key Cryptography

Public-Key Cryptography

Lecture 7

Public-Key Encryption

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CCA Security

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  - Only if it is her own original message!

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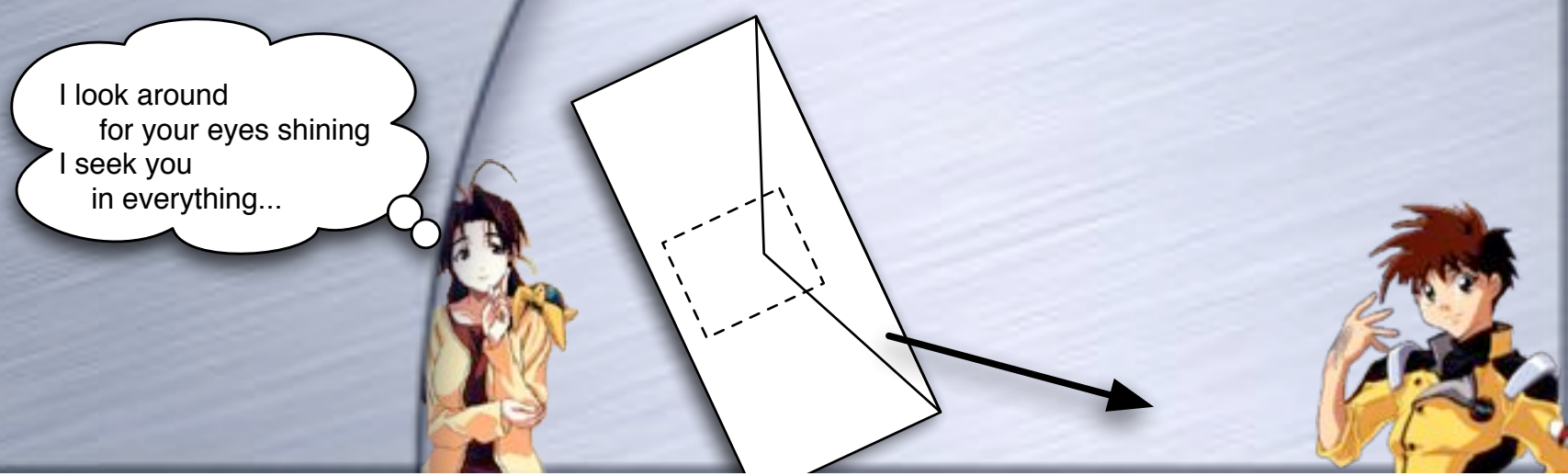

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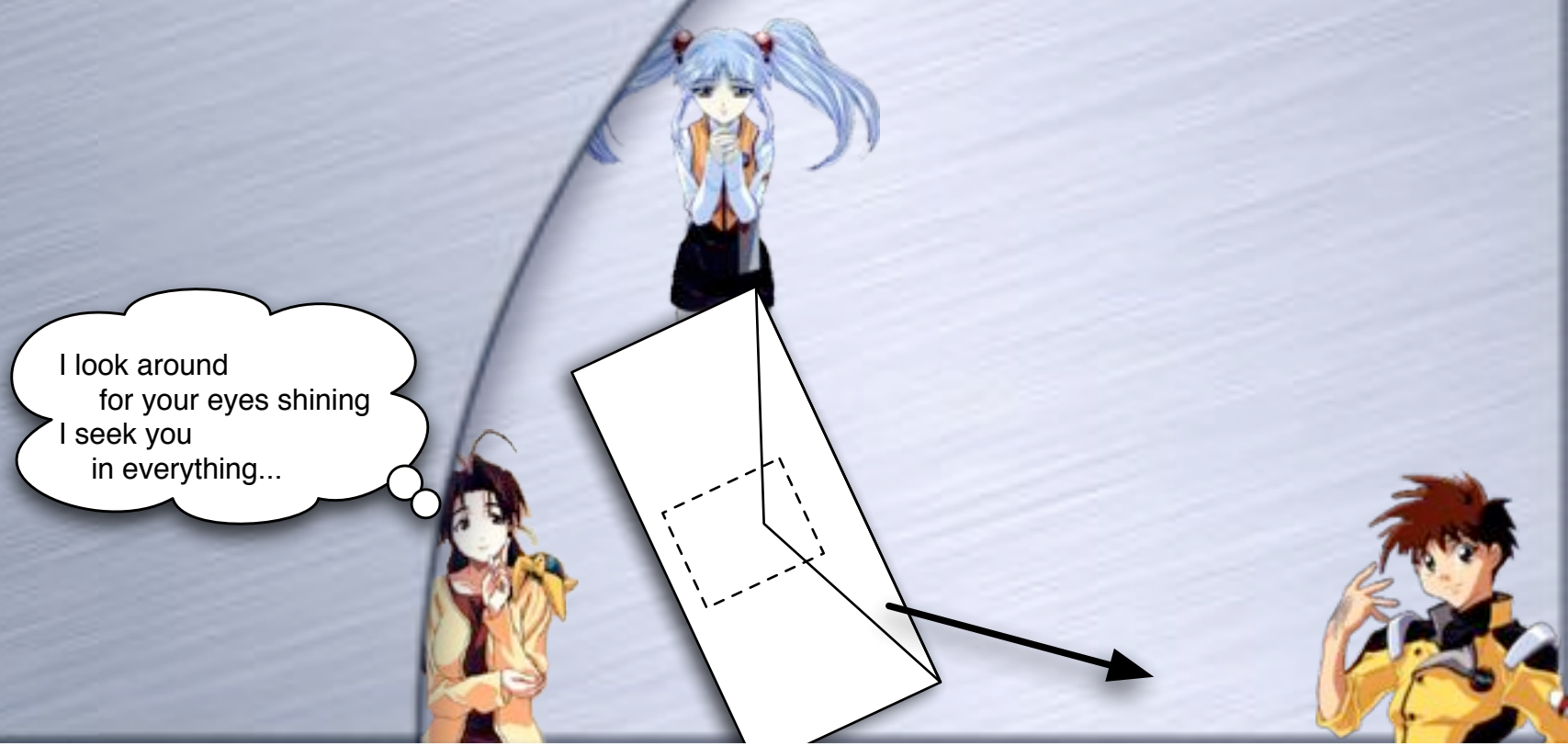

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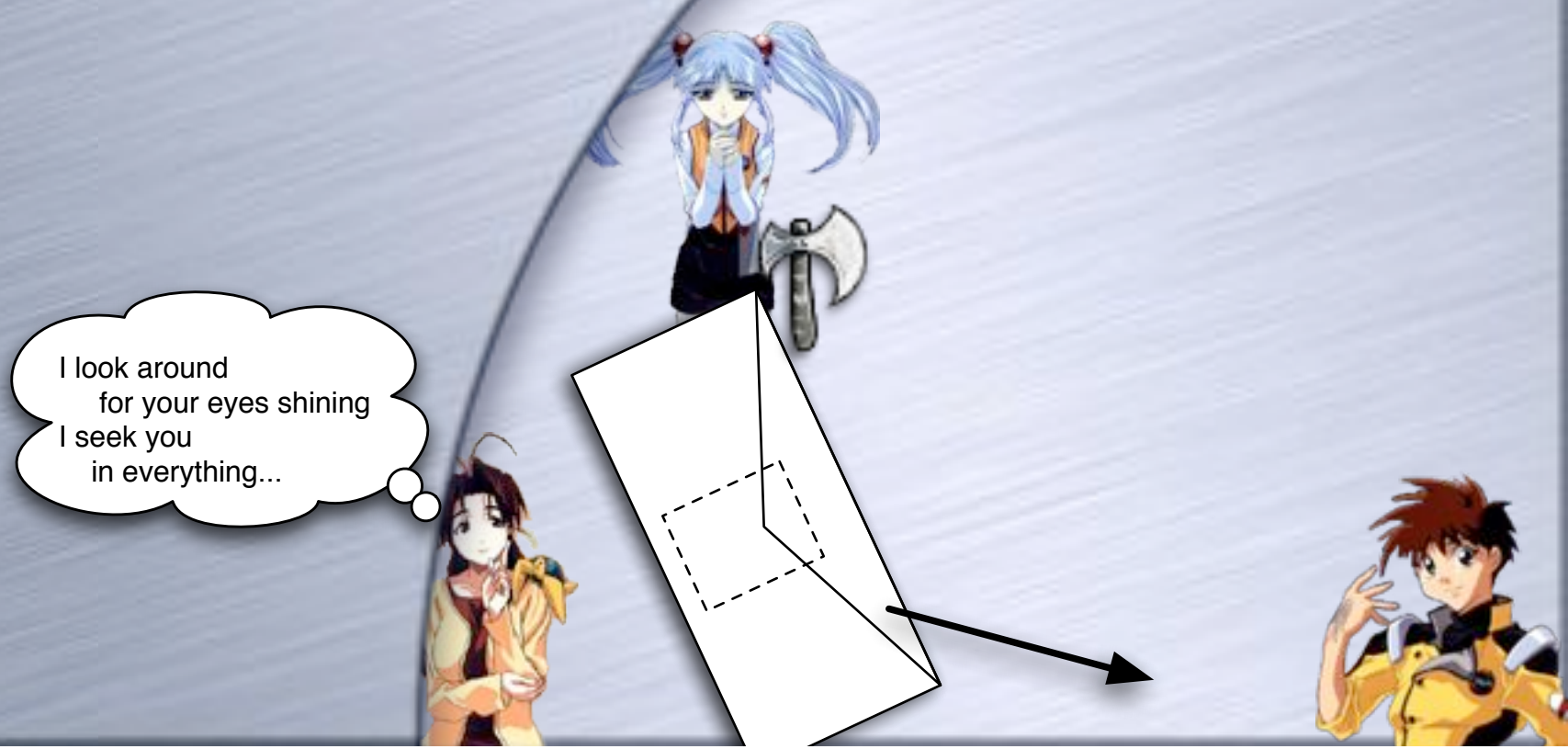

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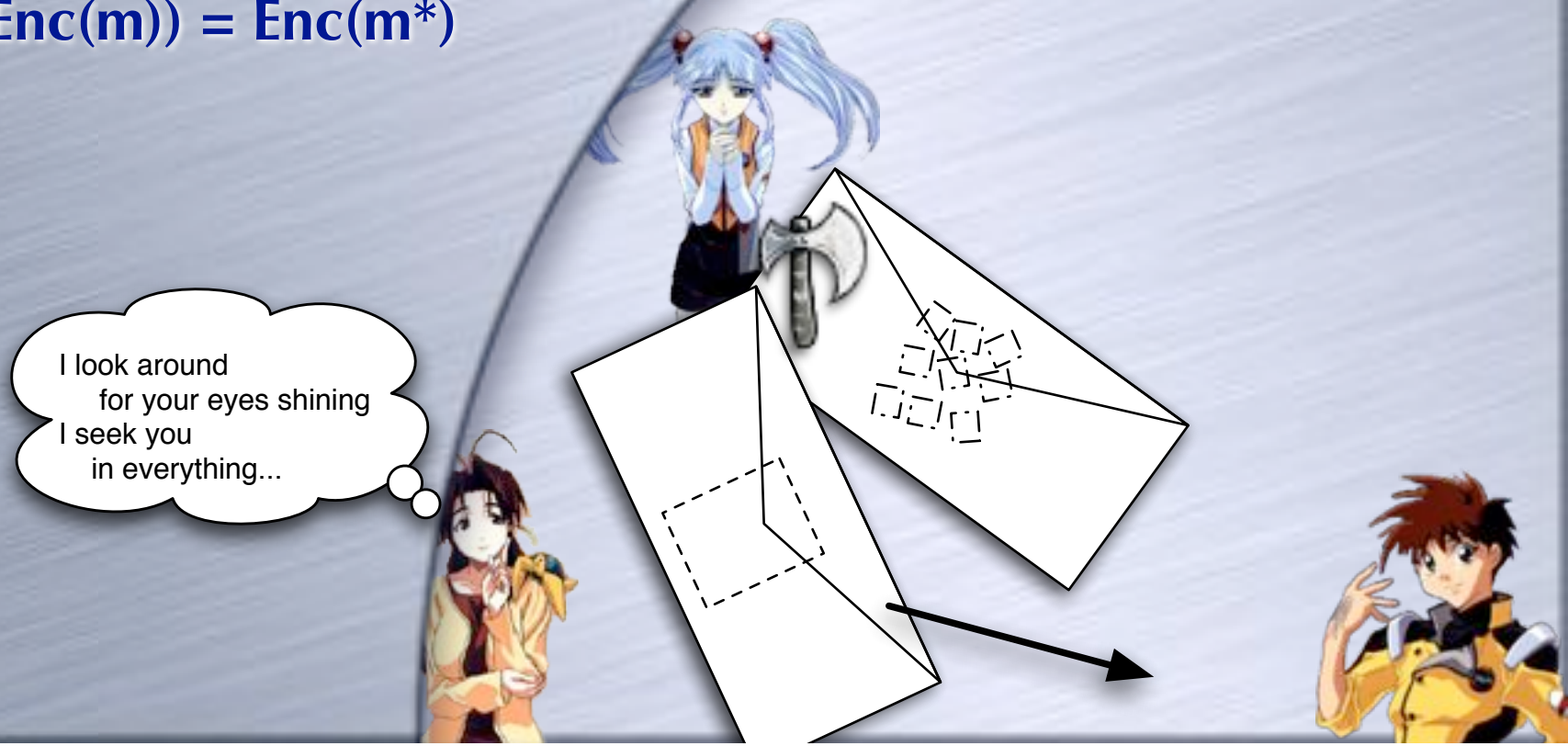

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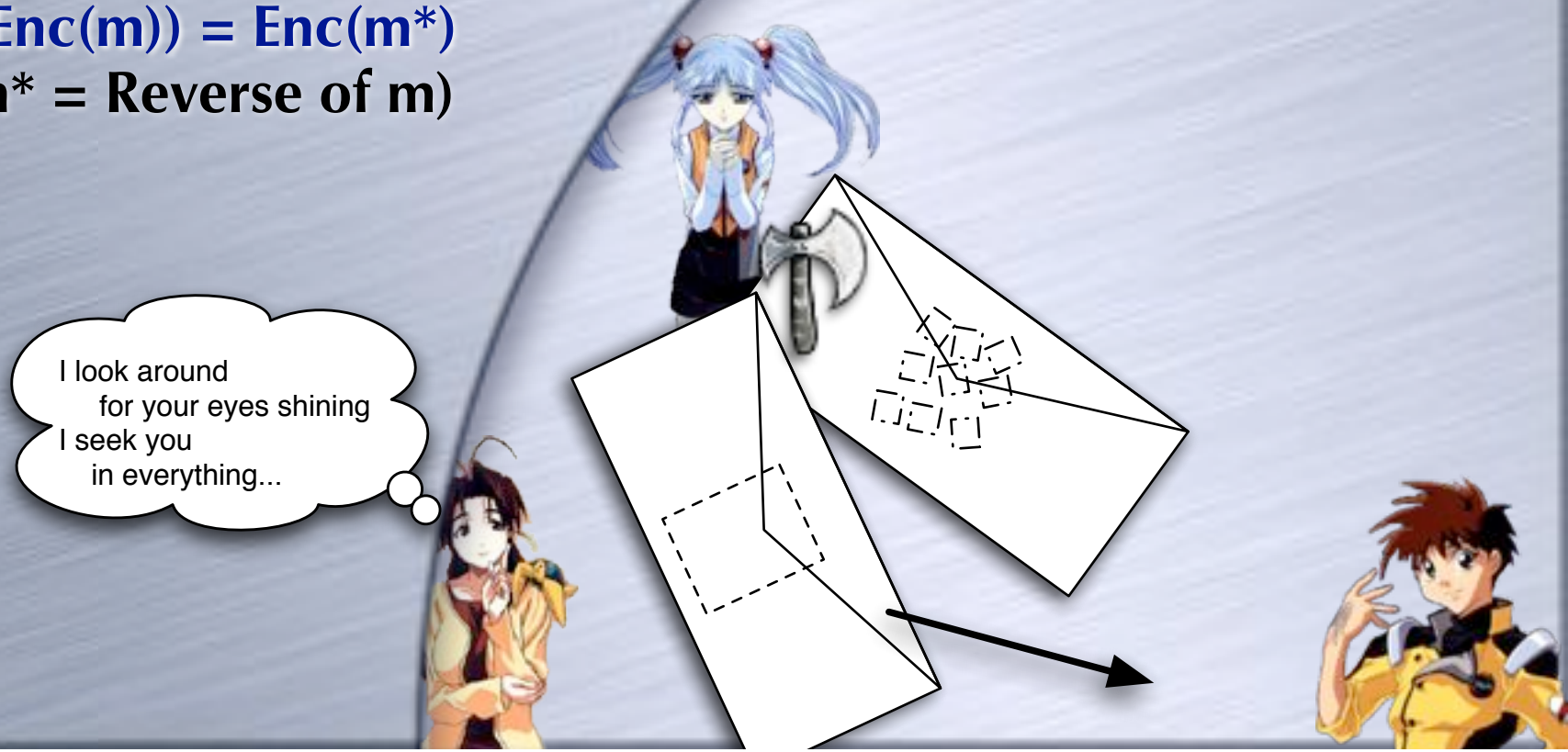

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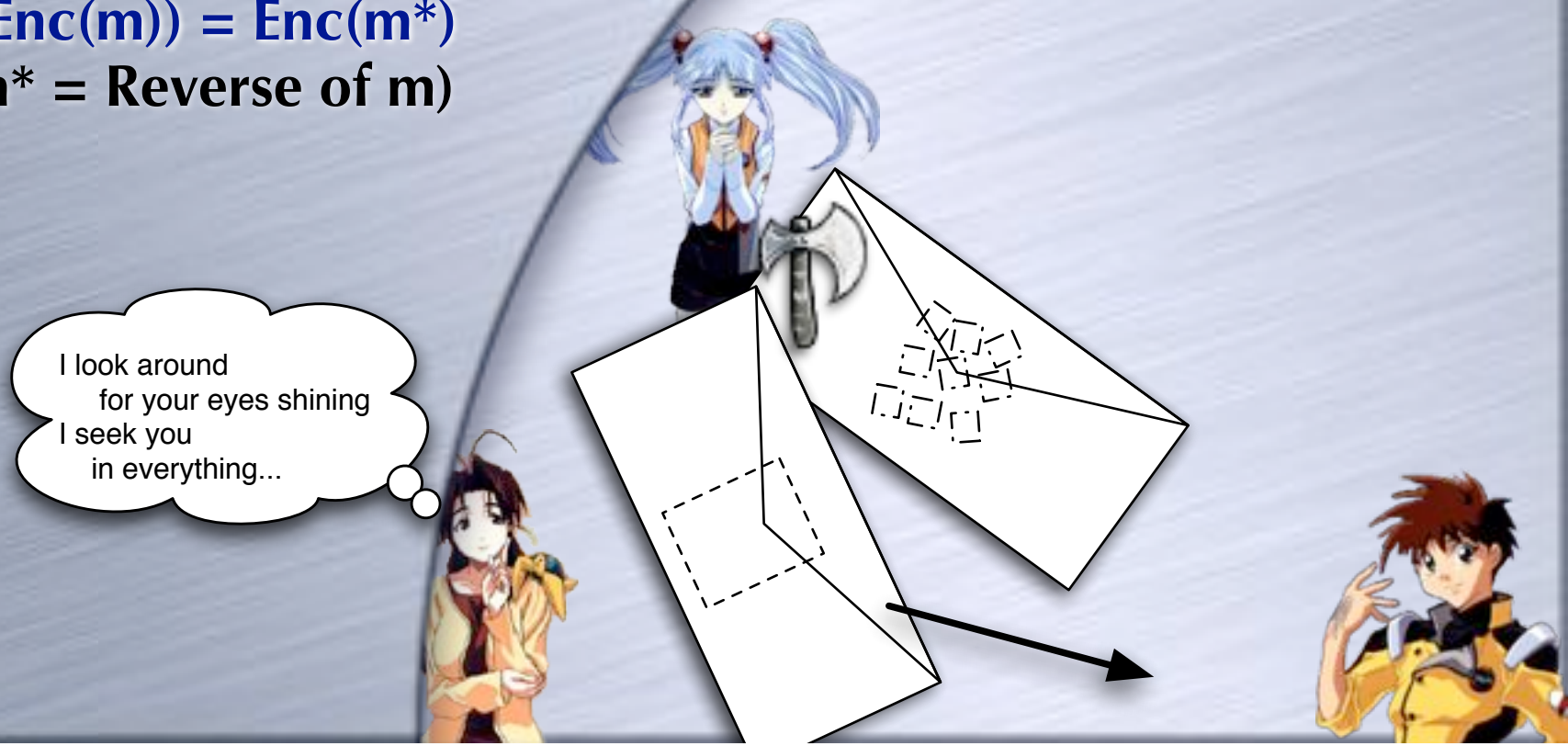

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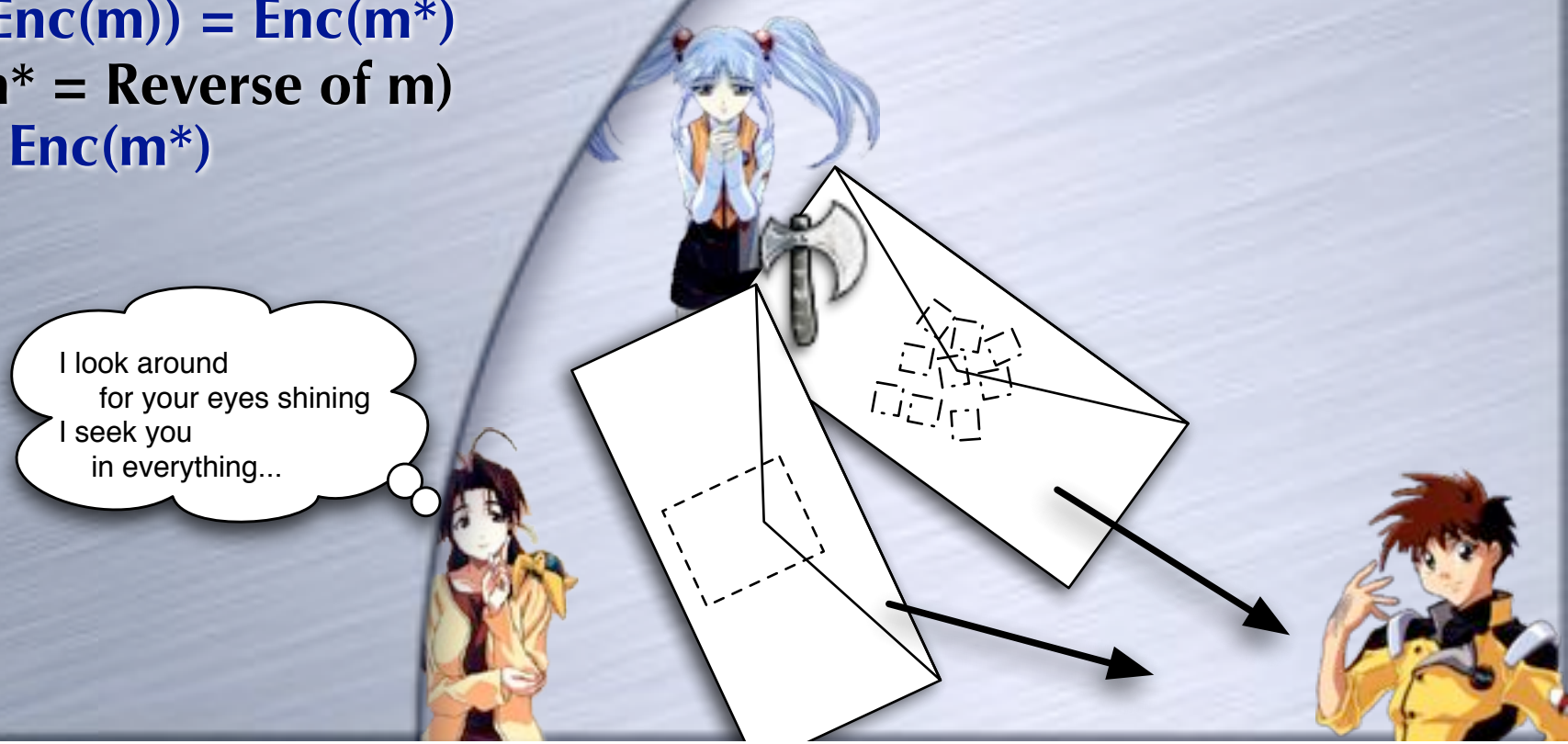

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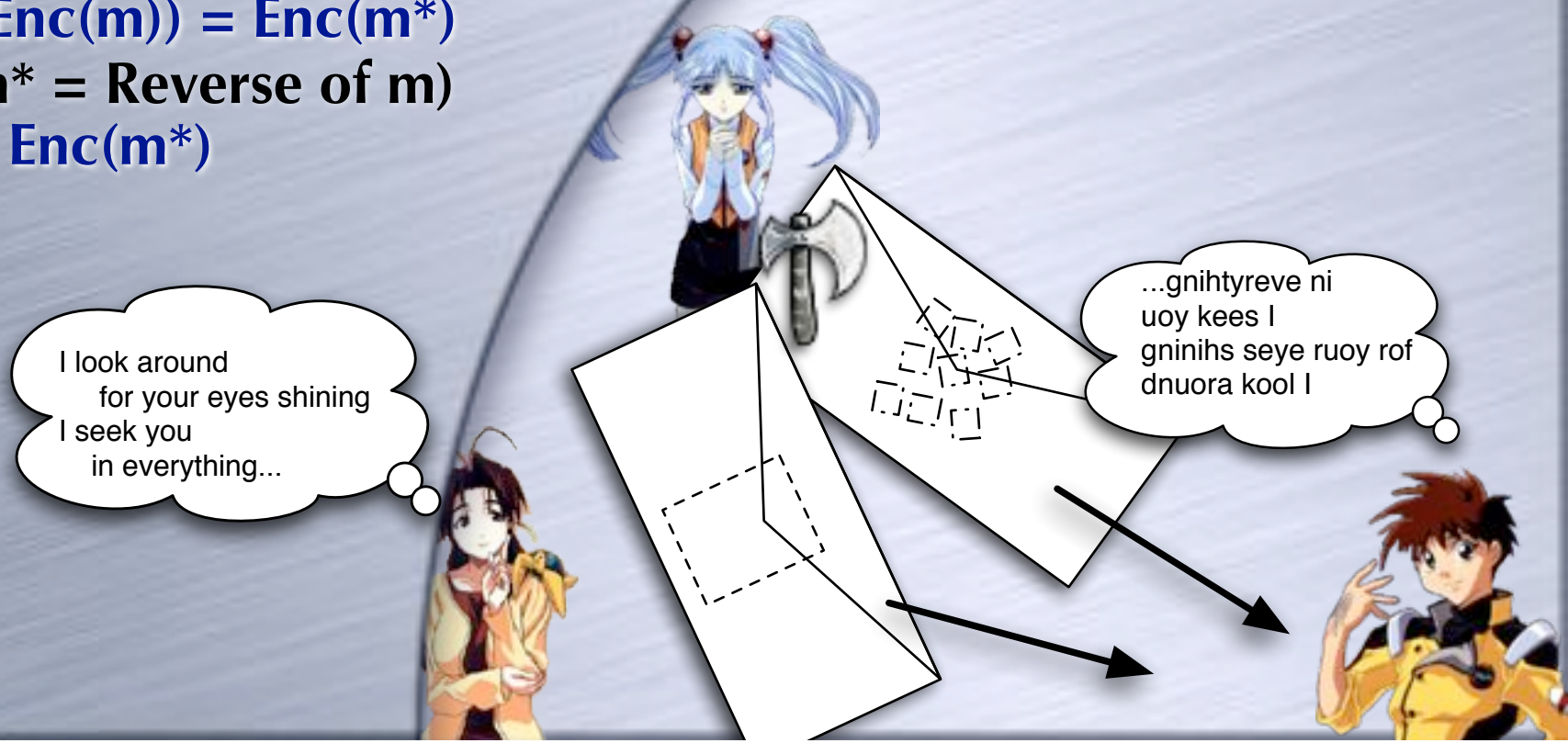

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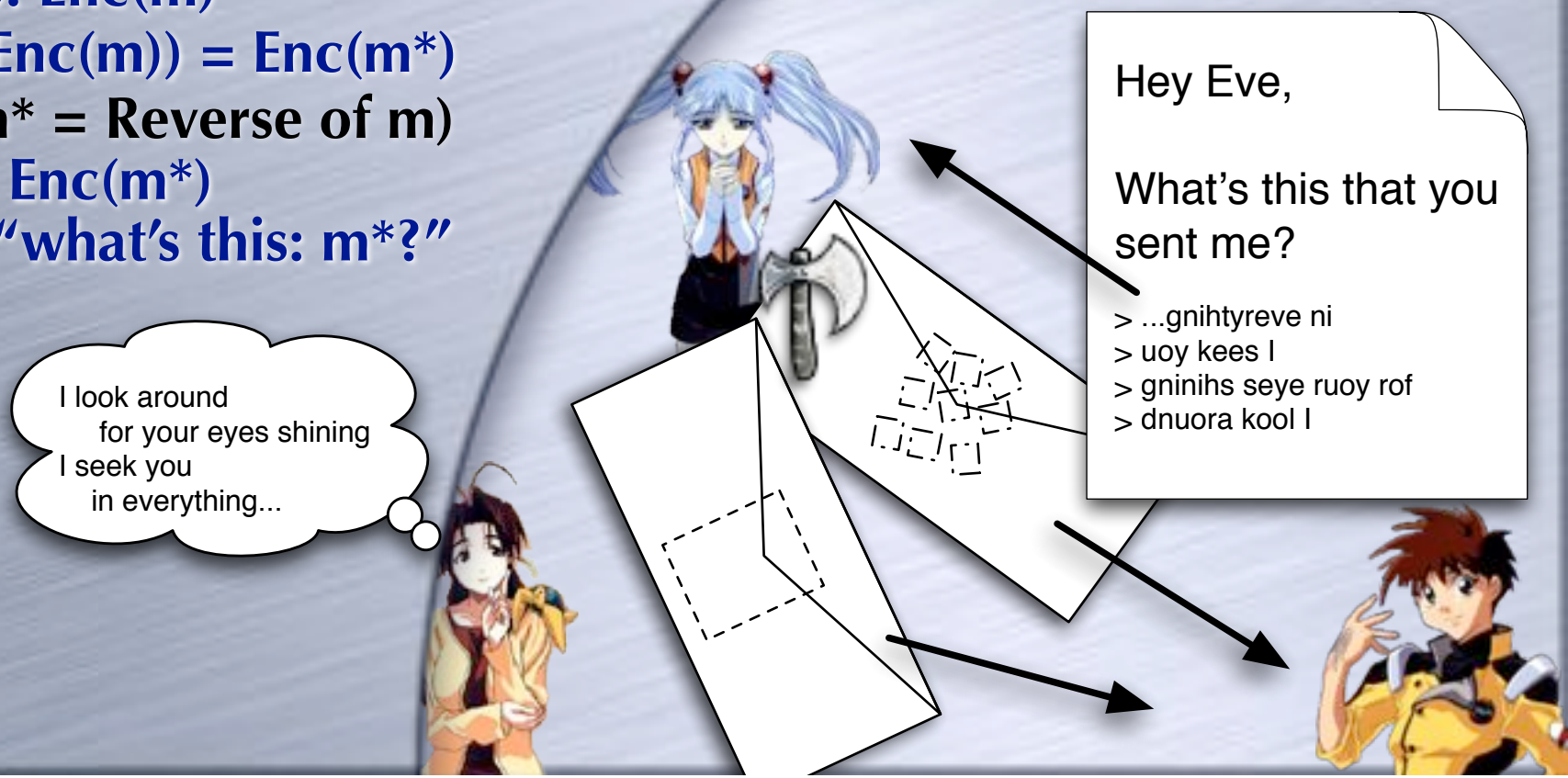

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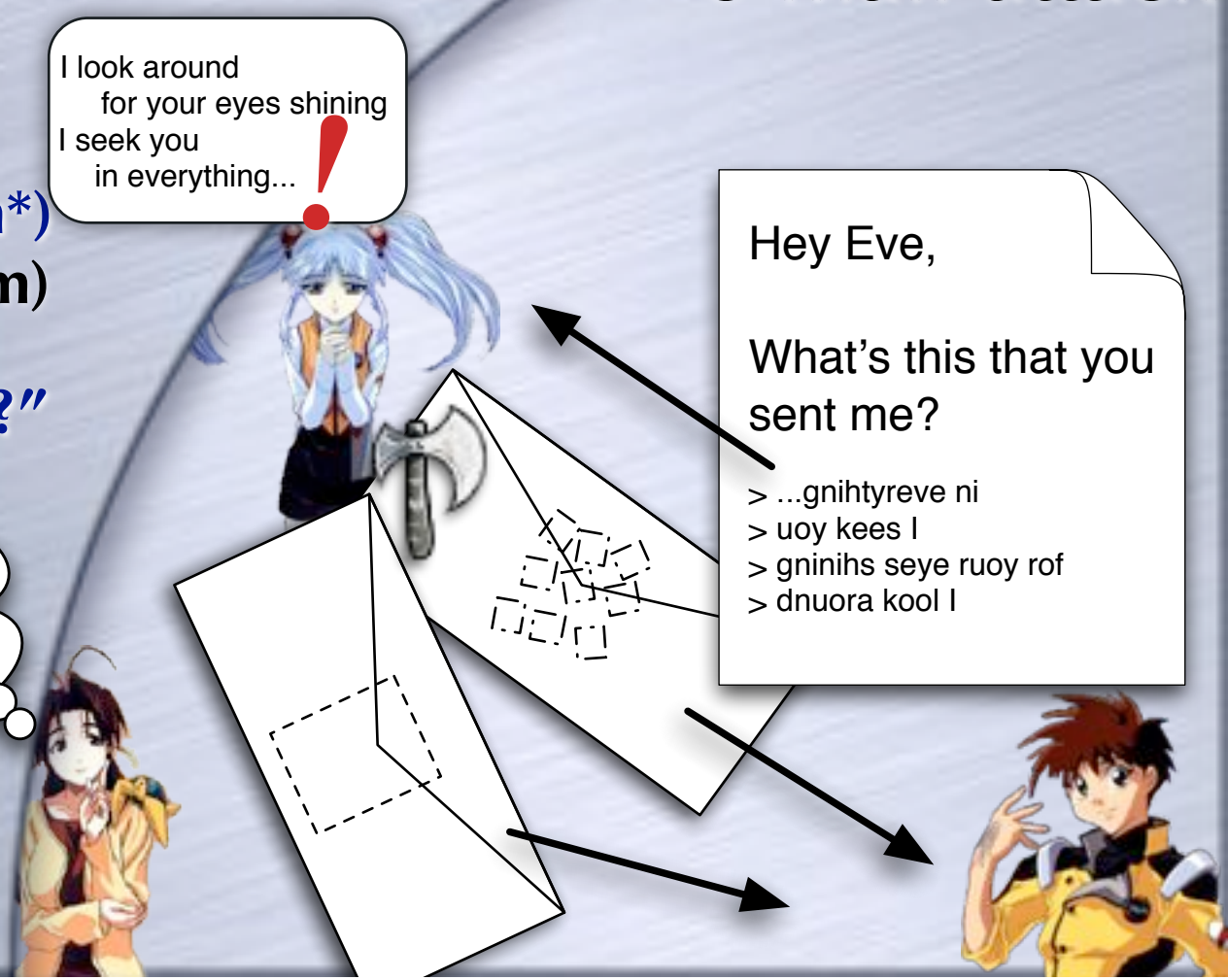

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  - Then Eve can exploit malleability to learn something "related to" Alice's messages

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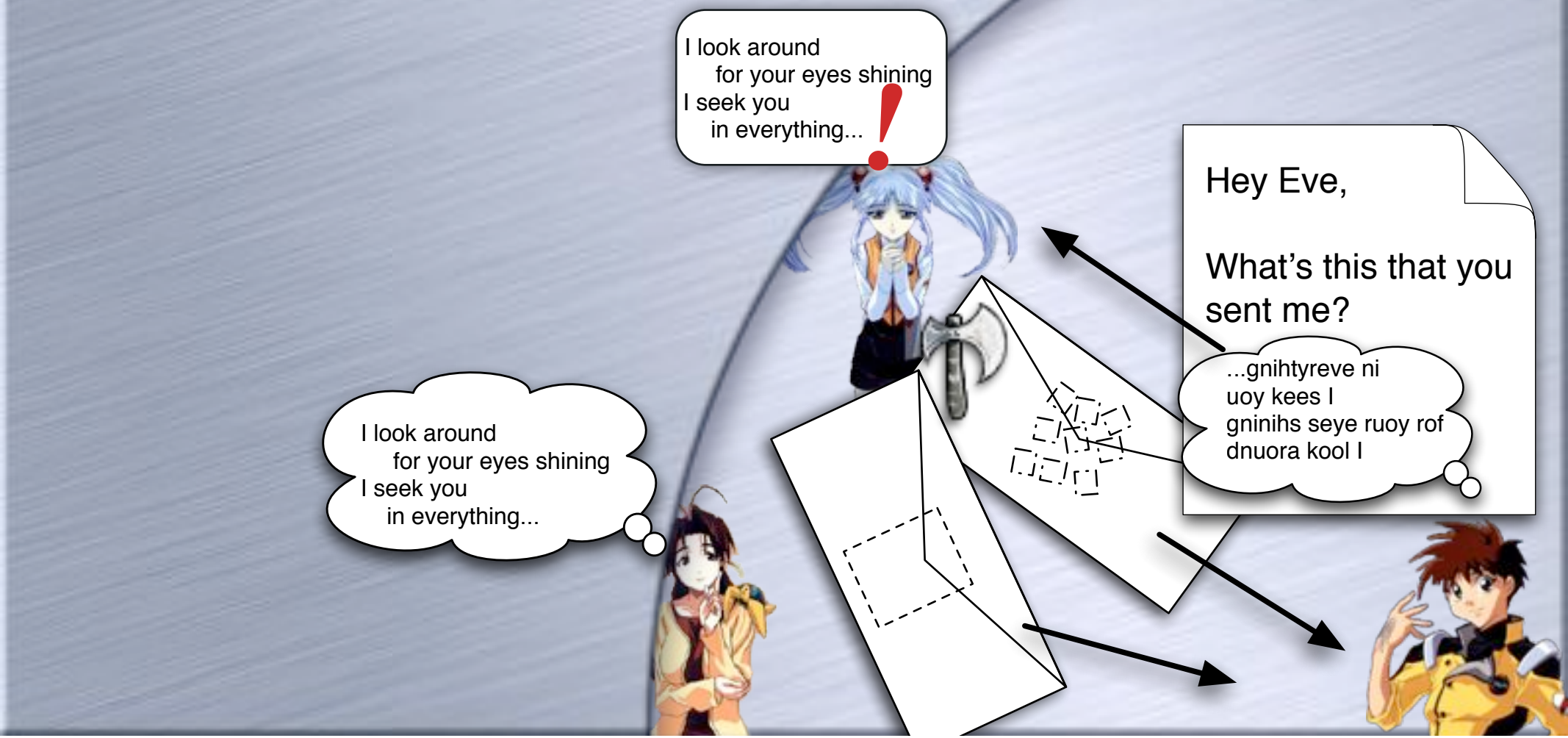

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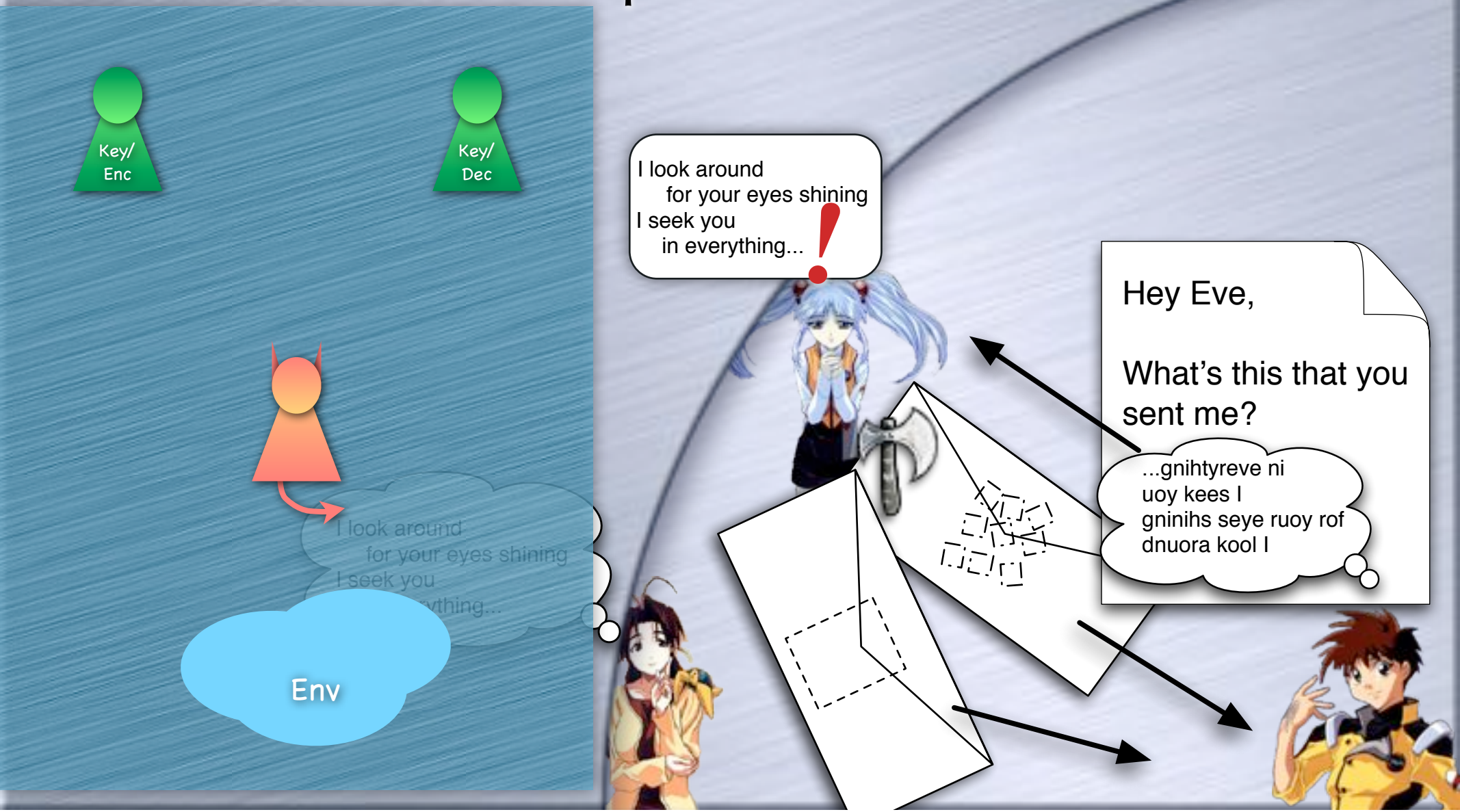

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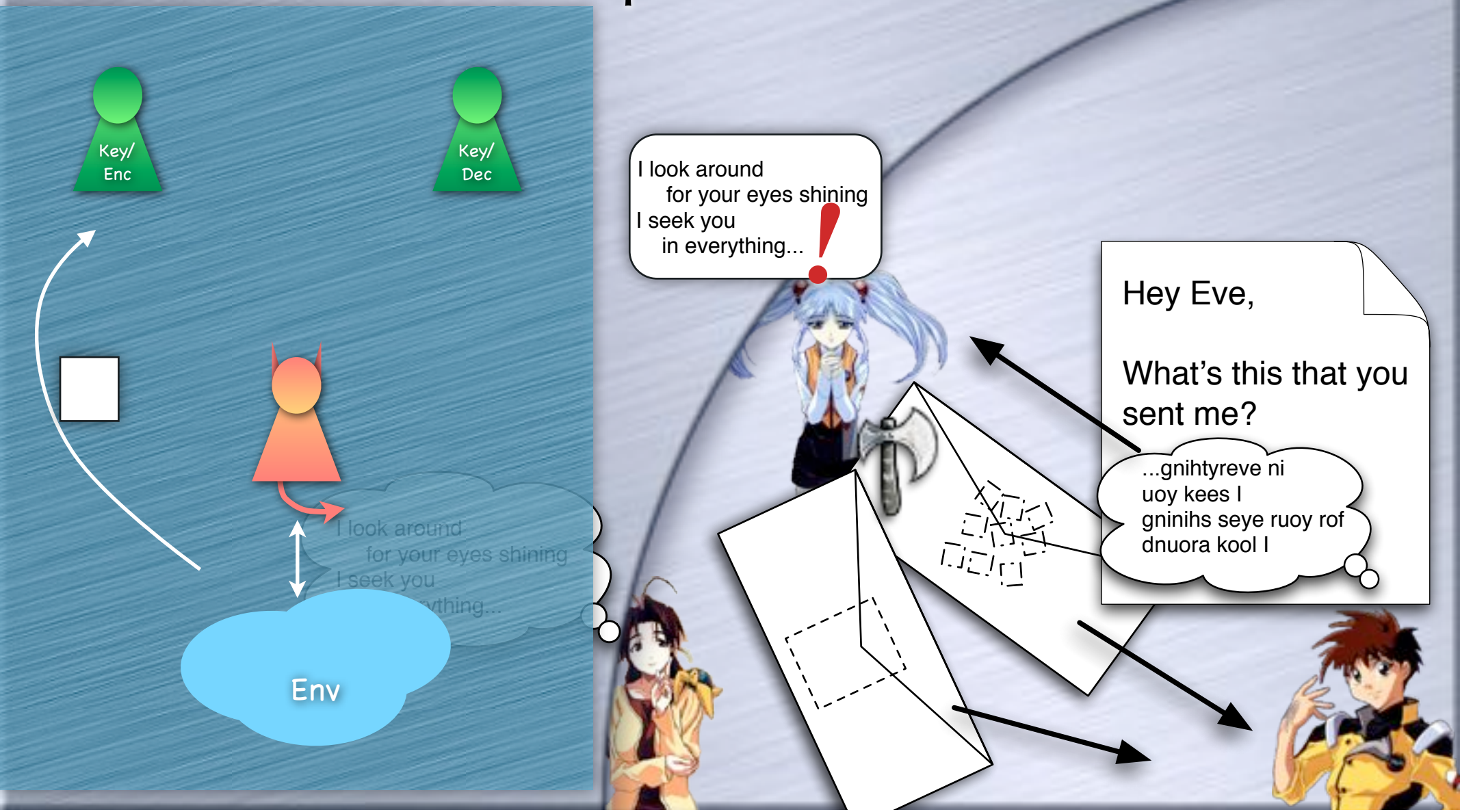

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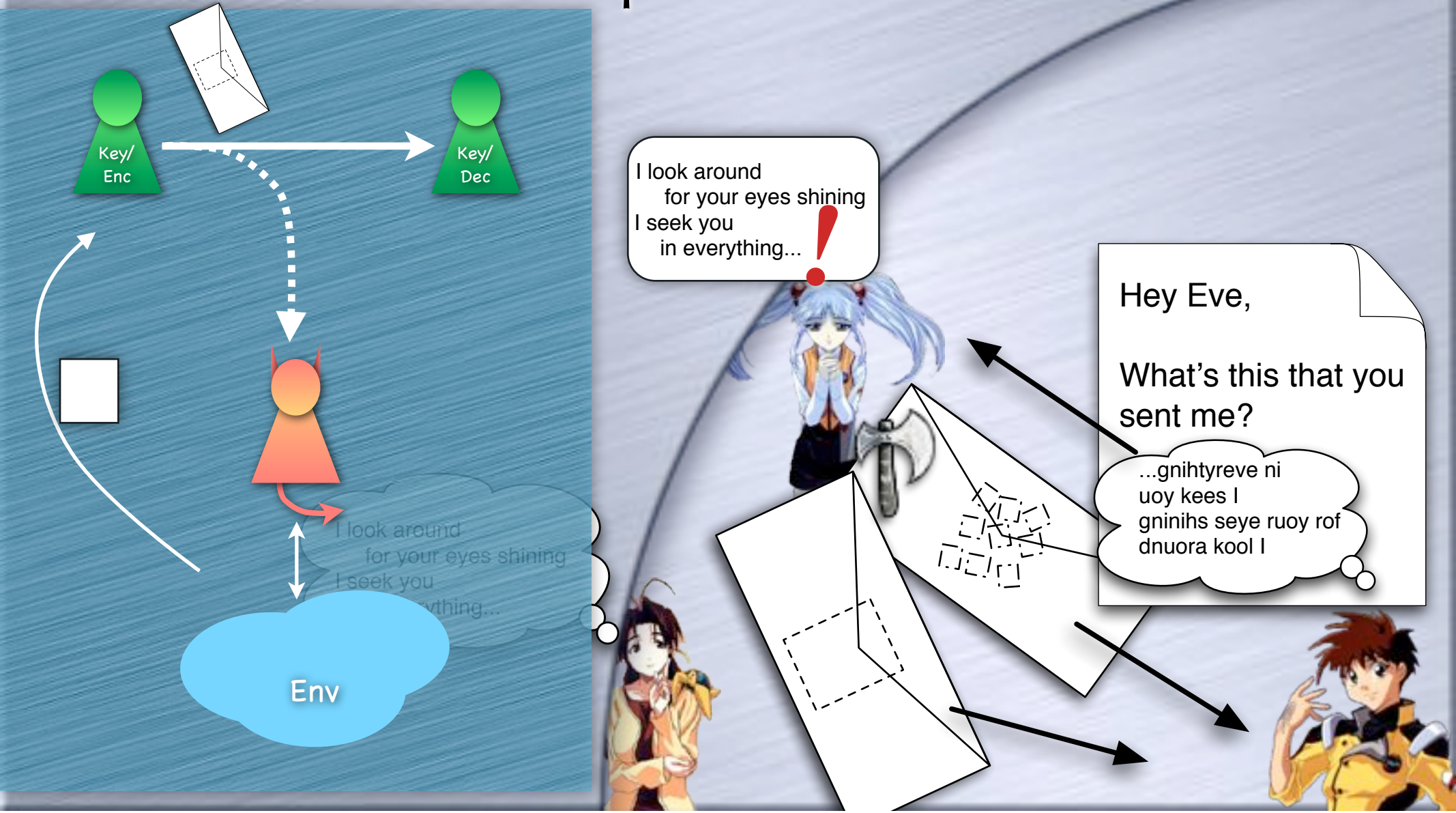

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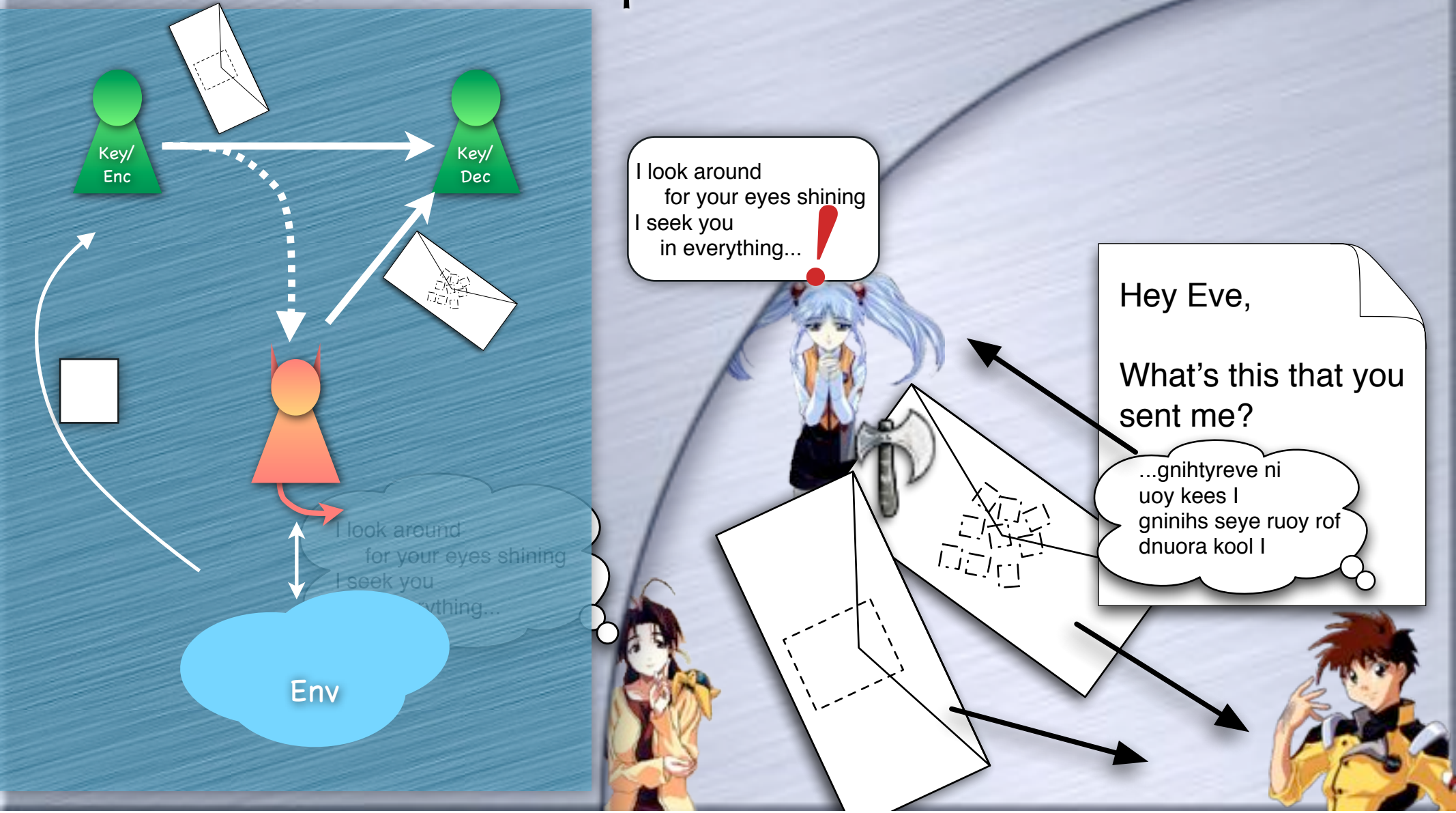

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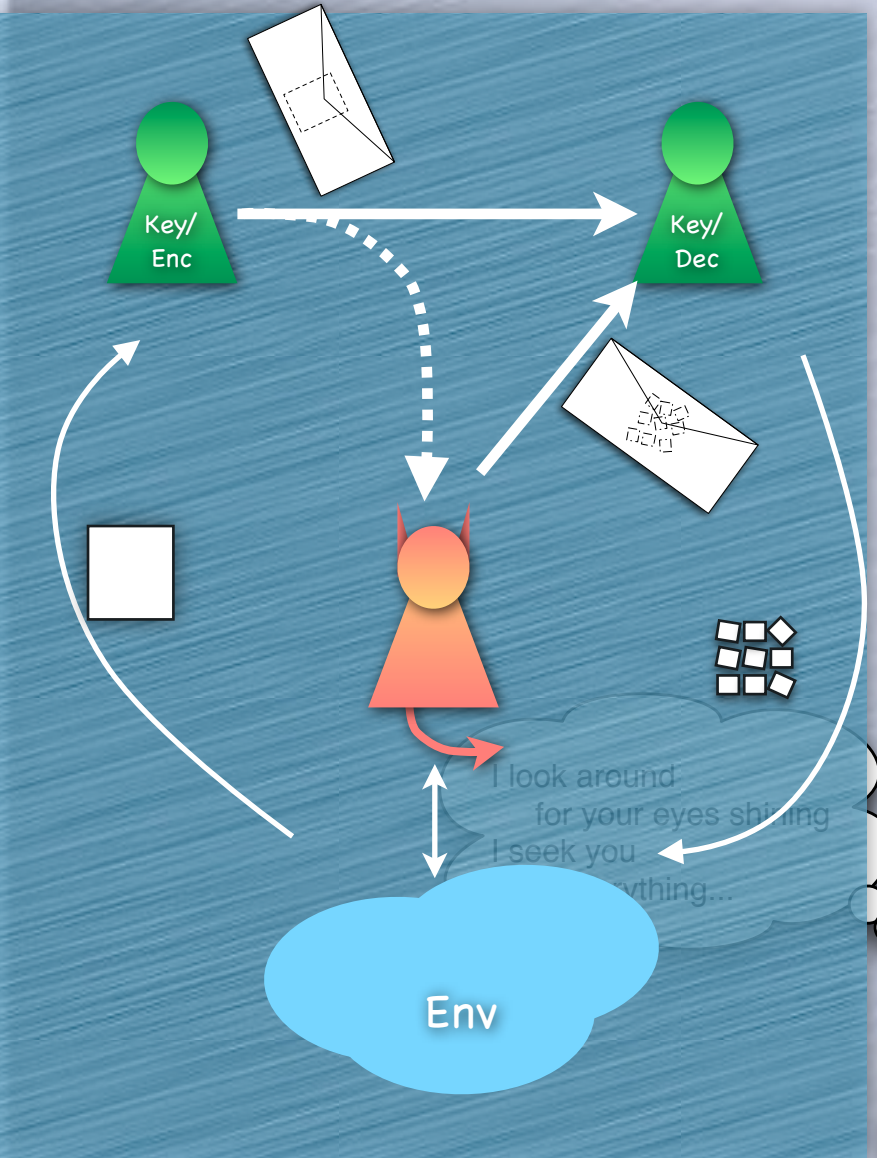

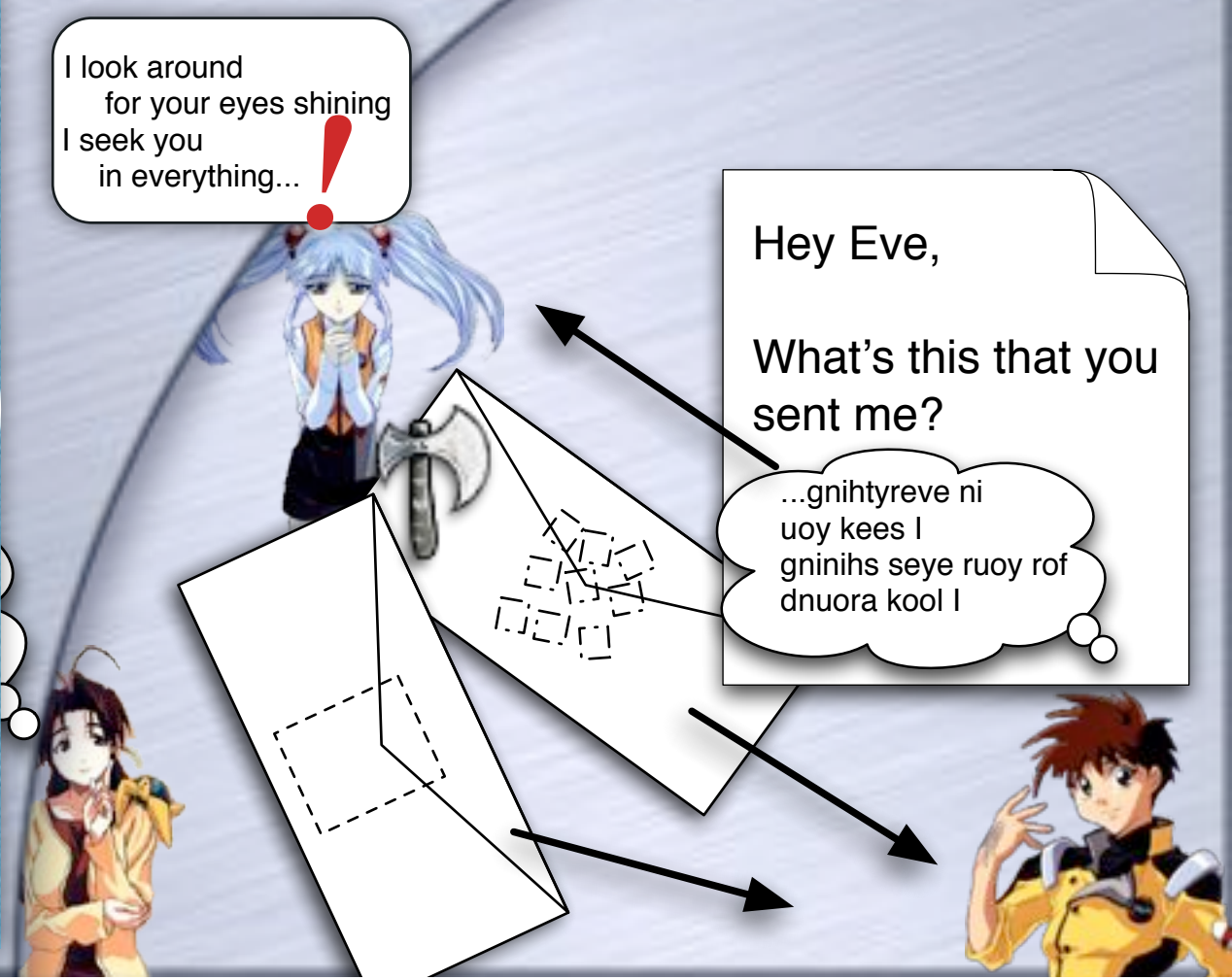

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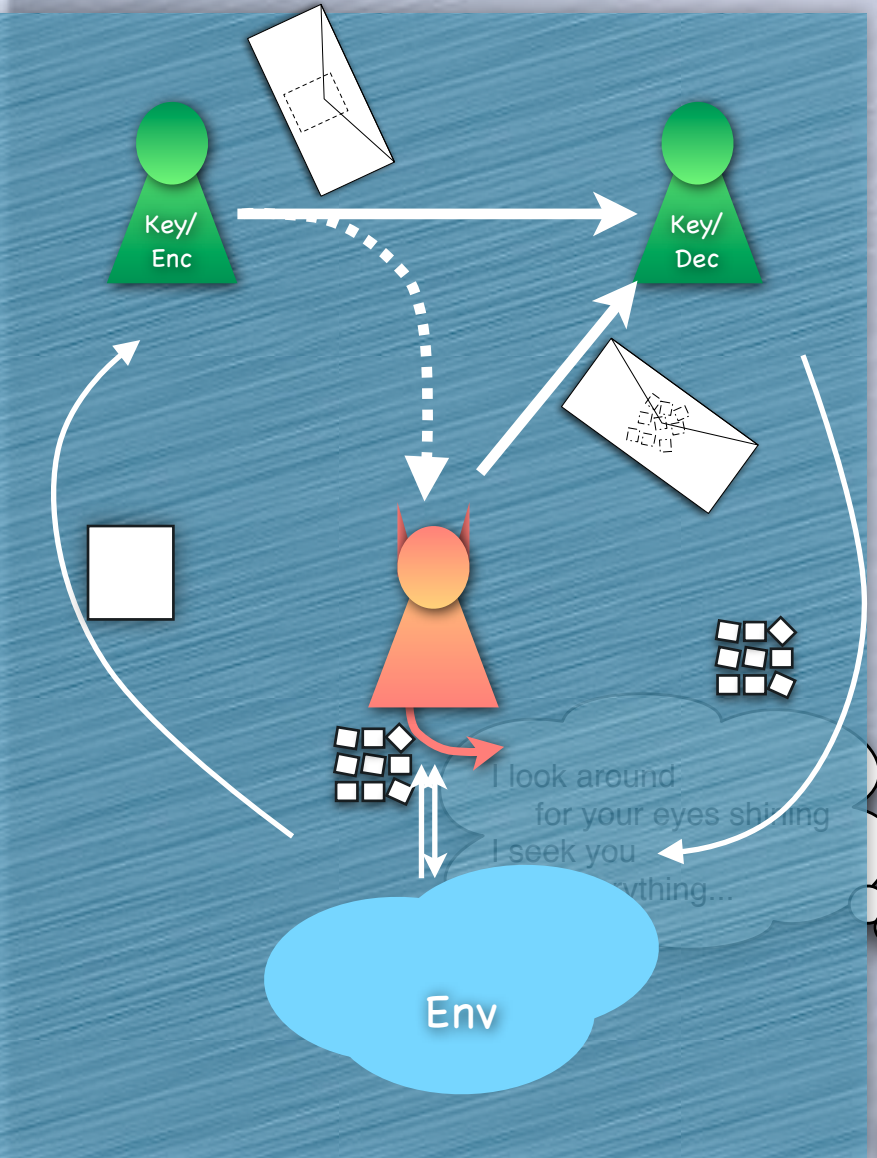

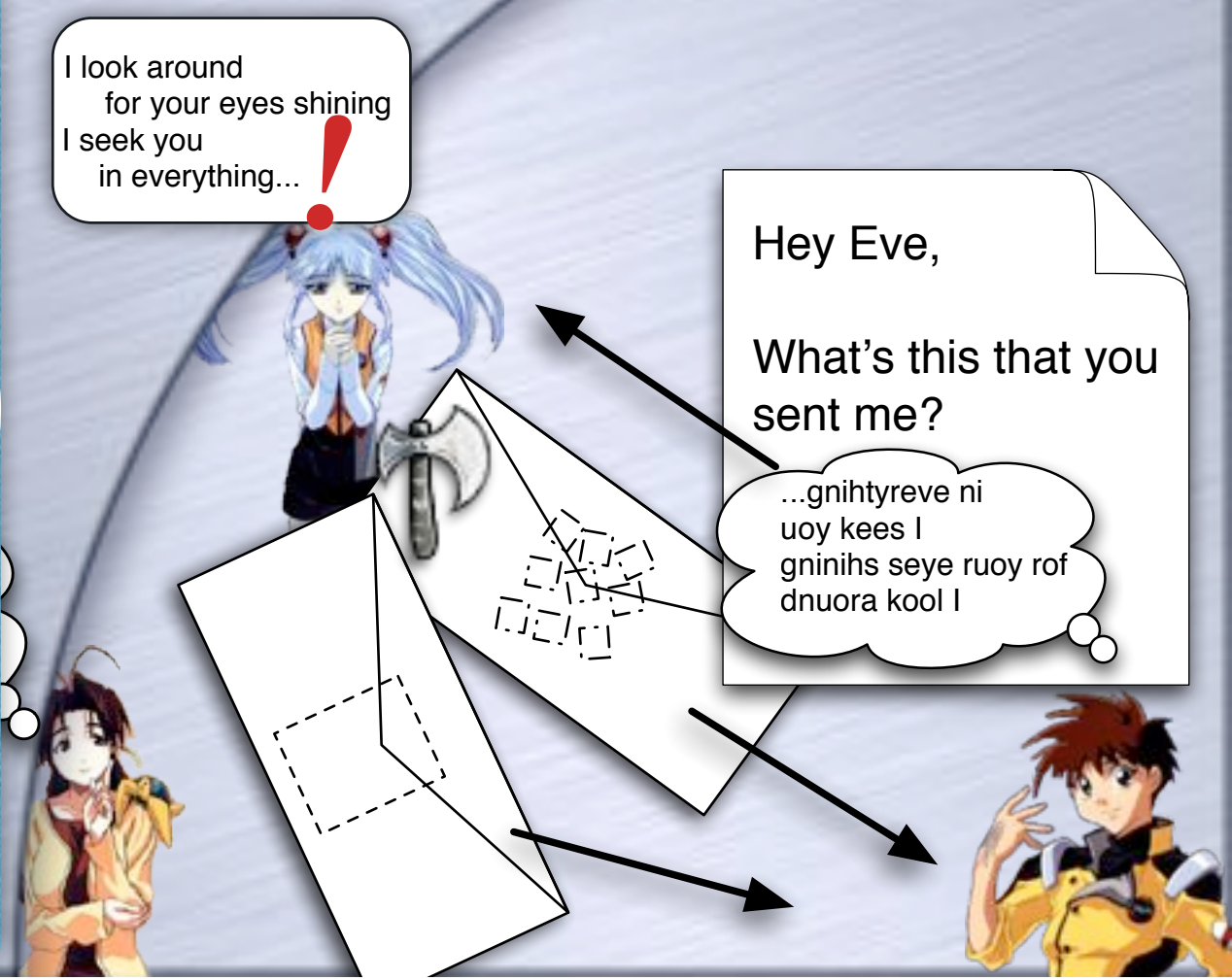

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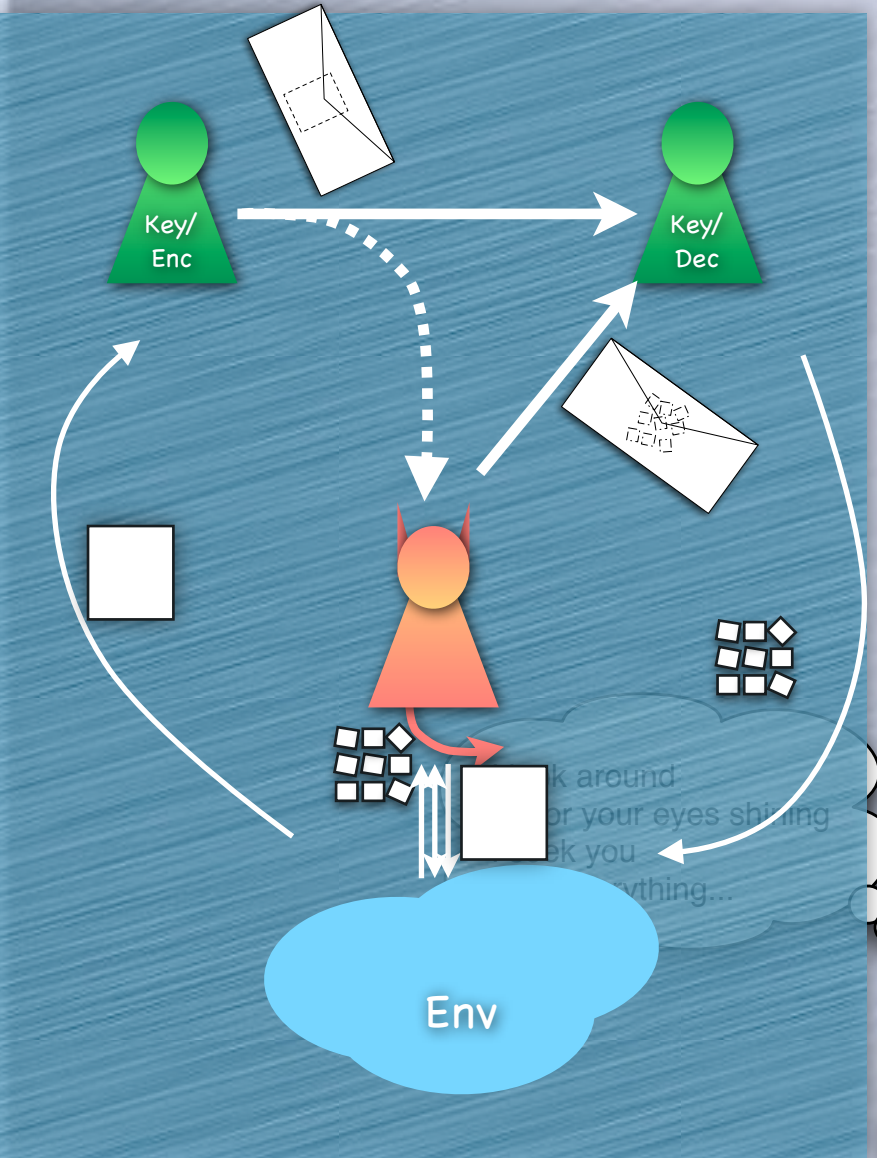

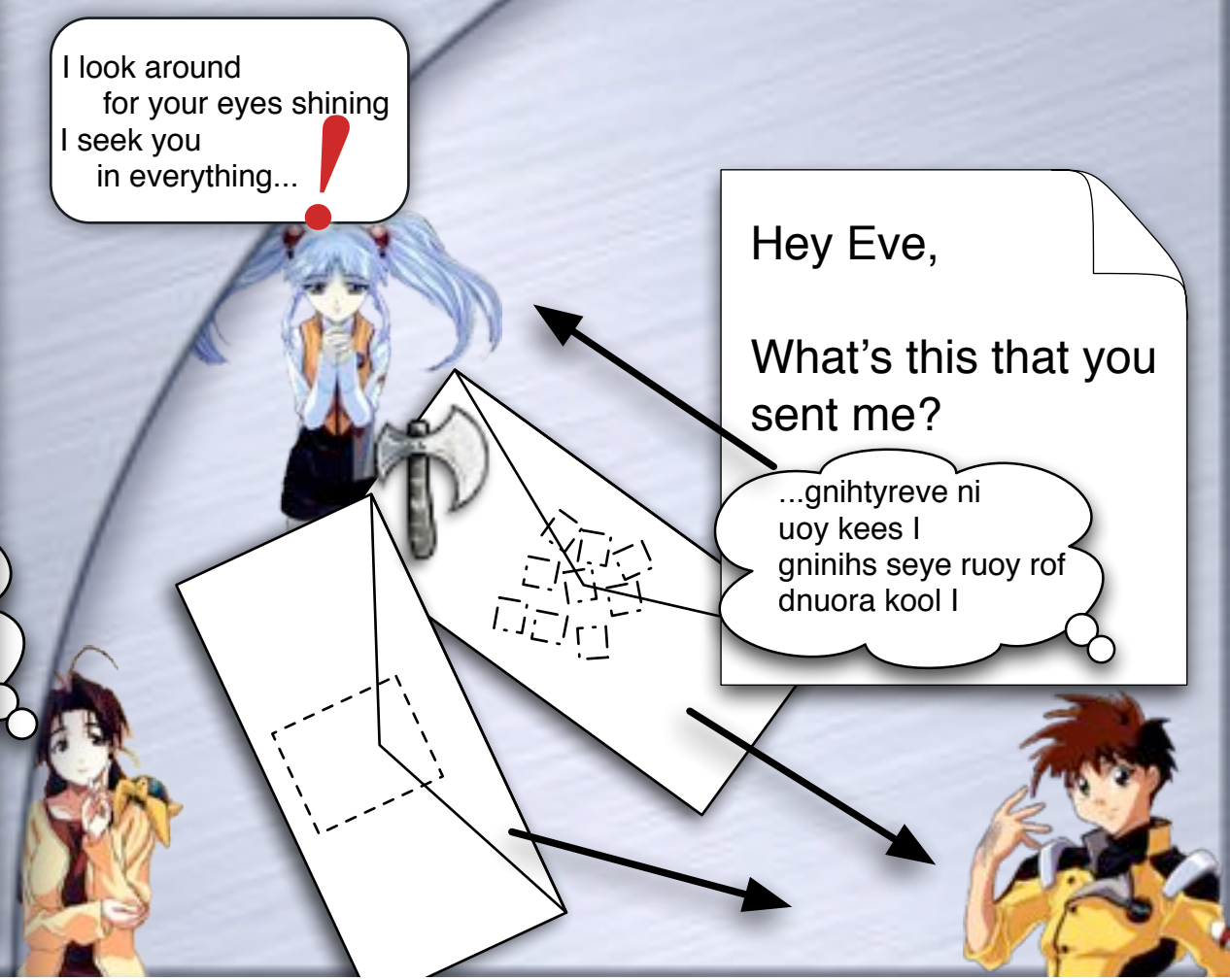

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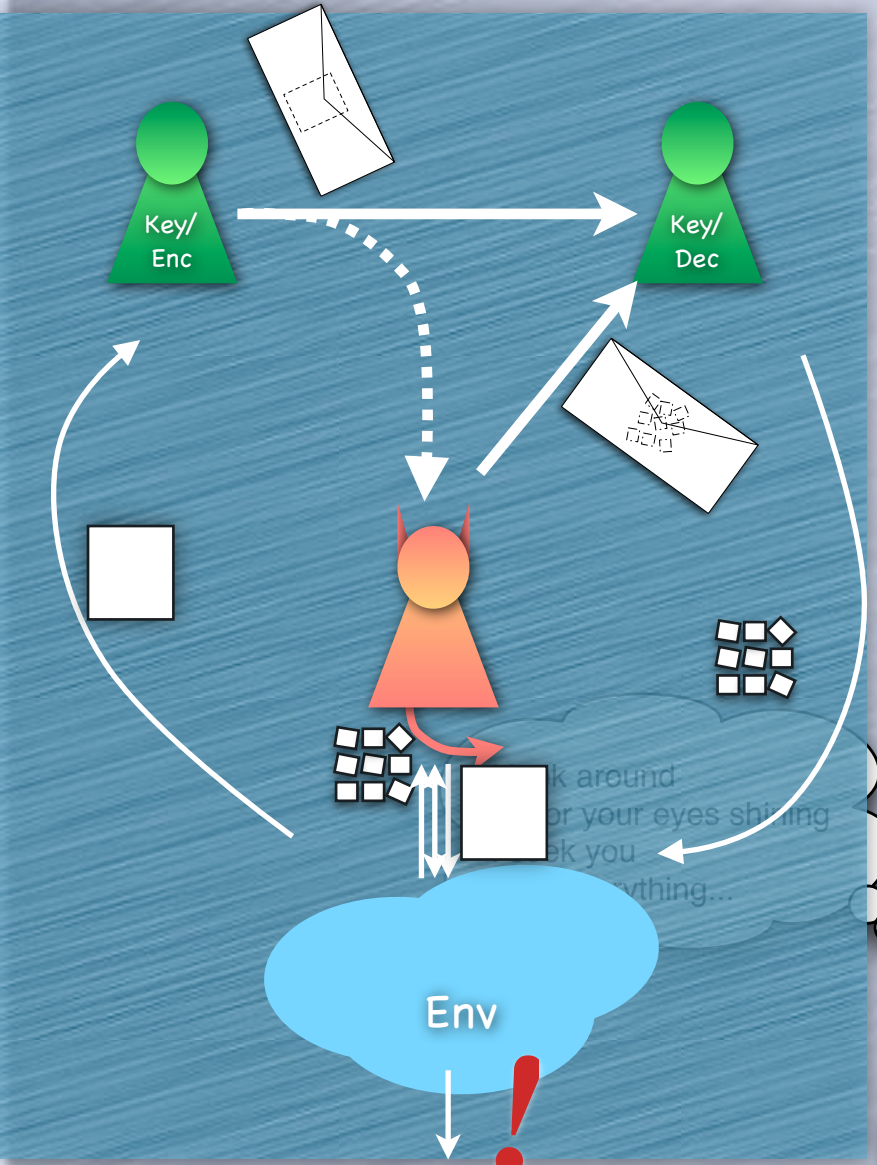

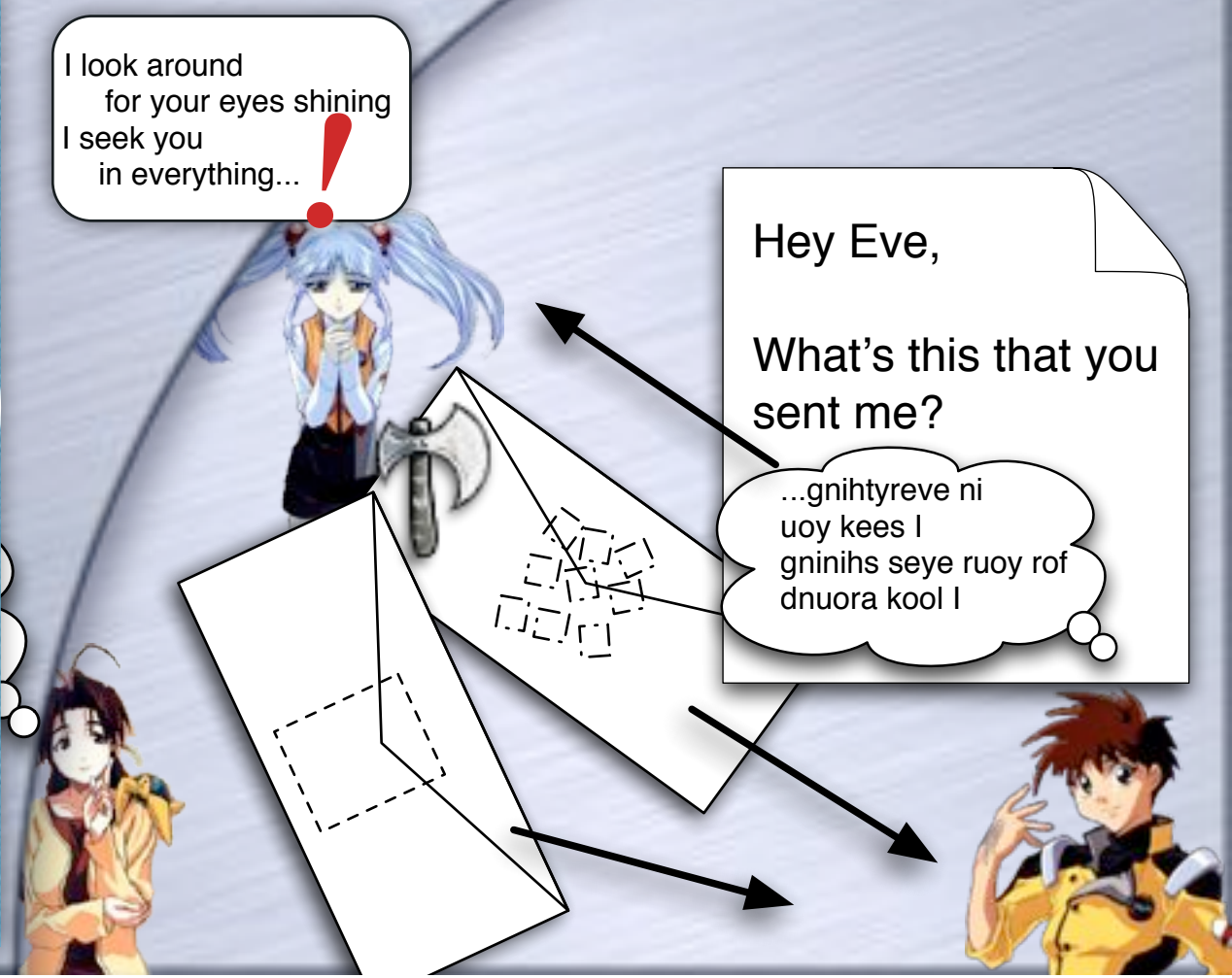

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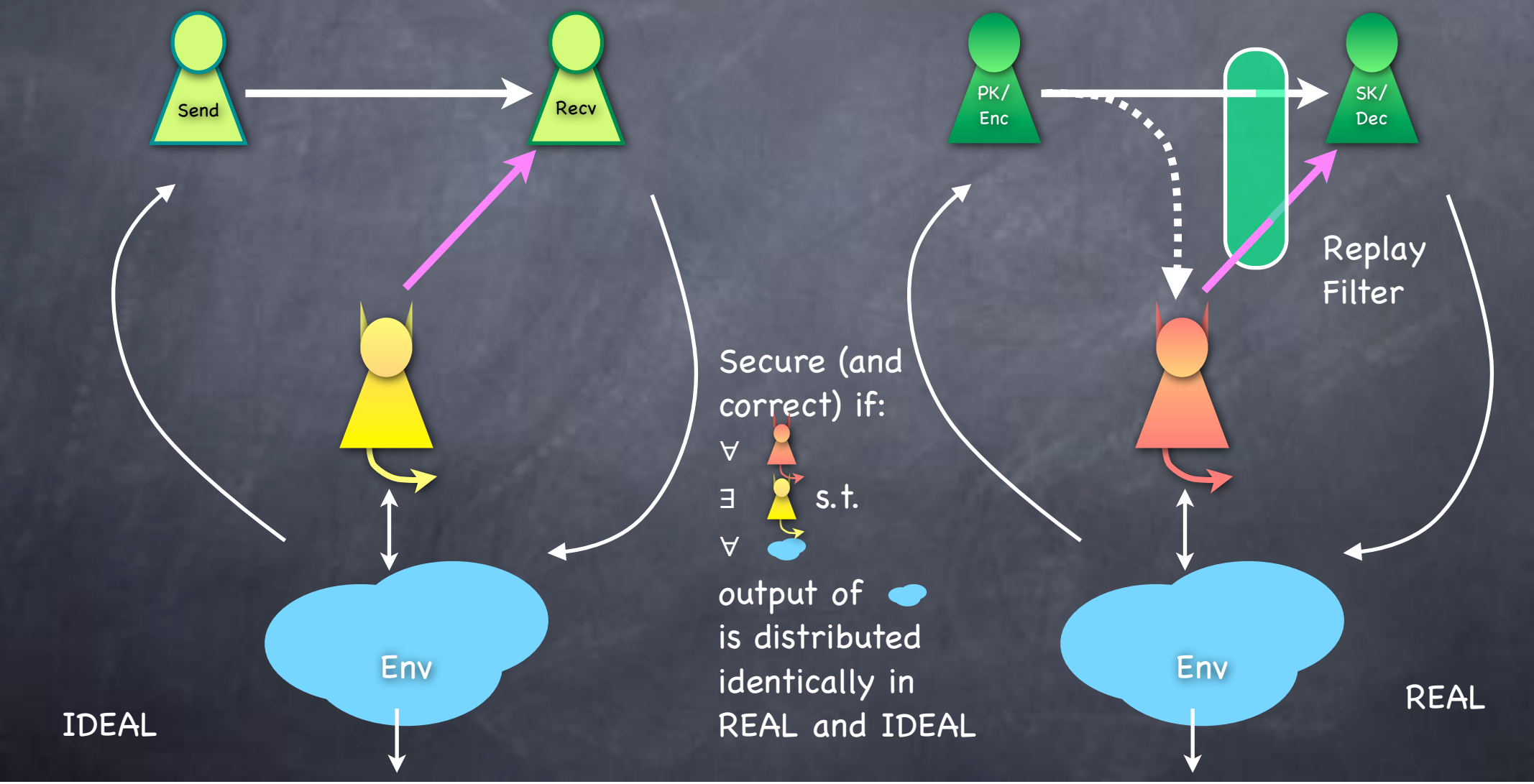

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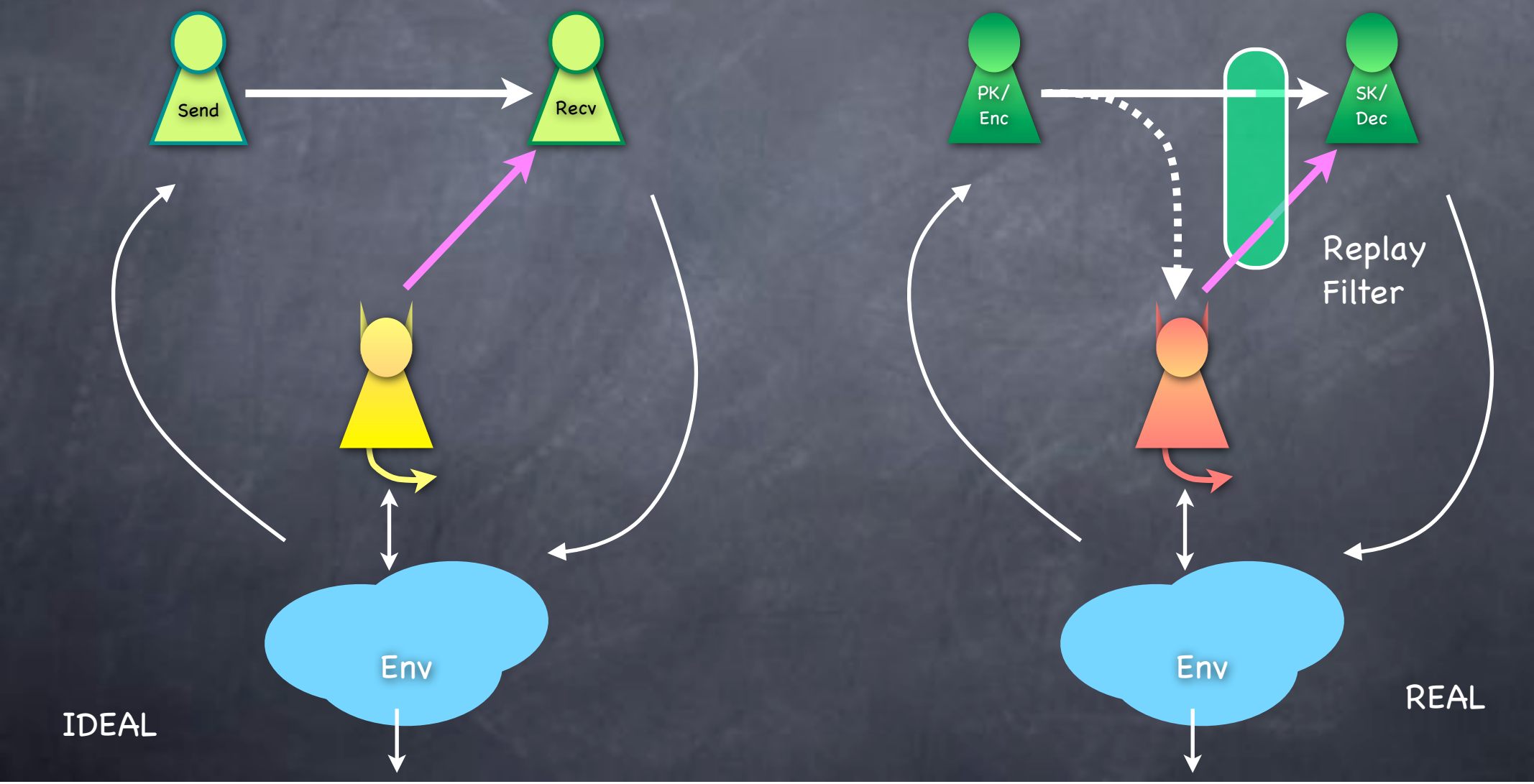

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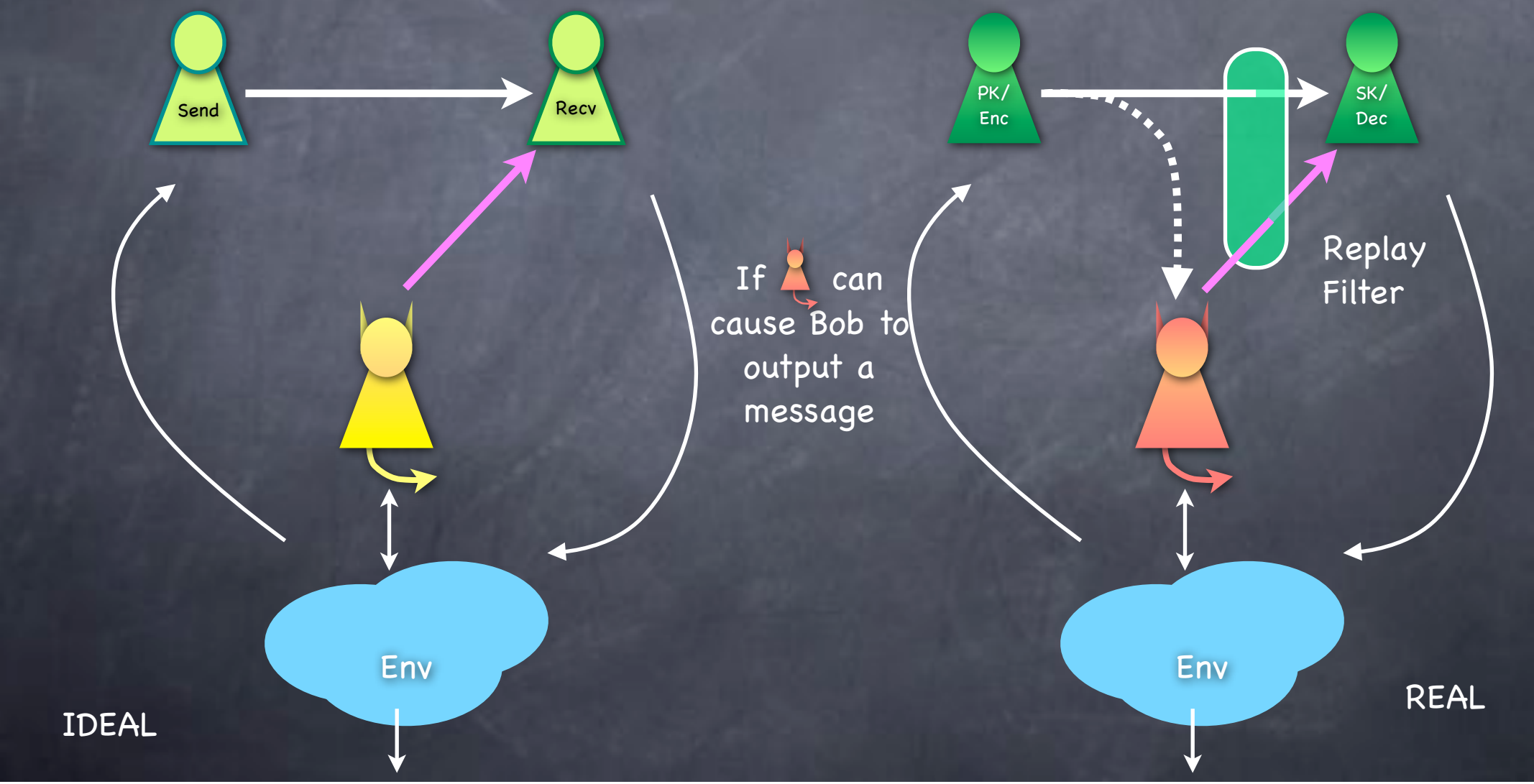

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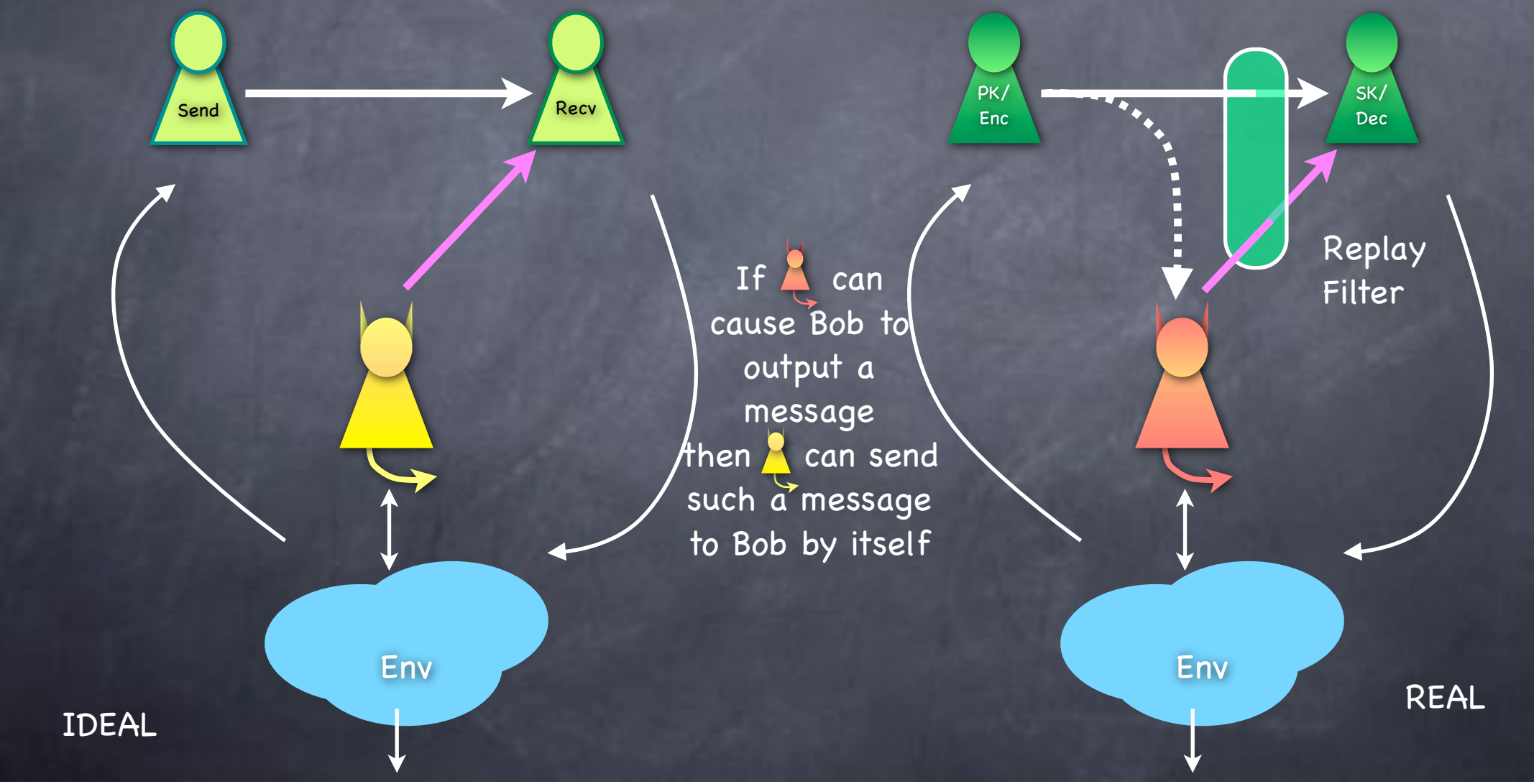

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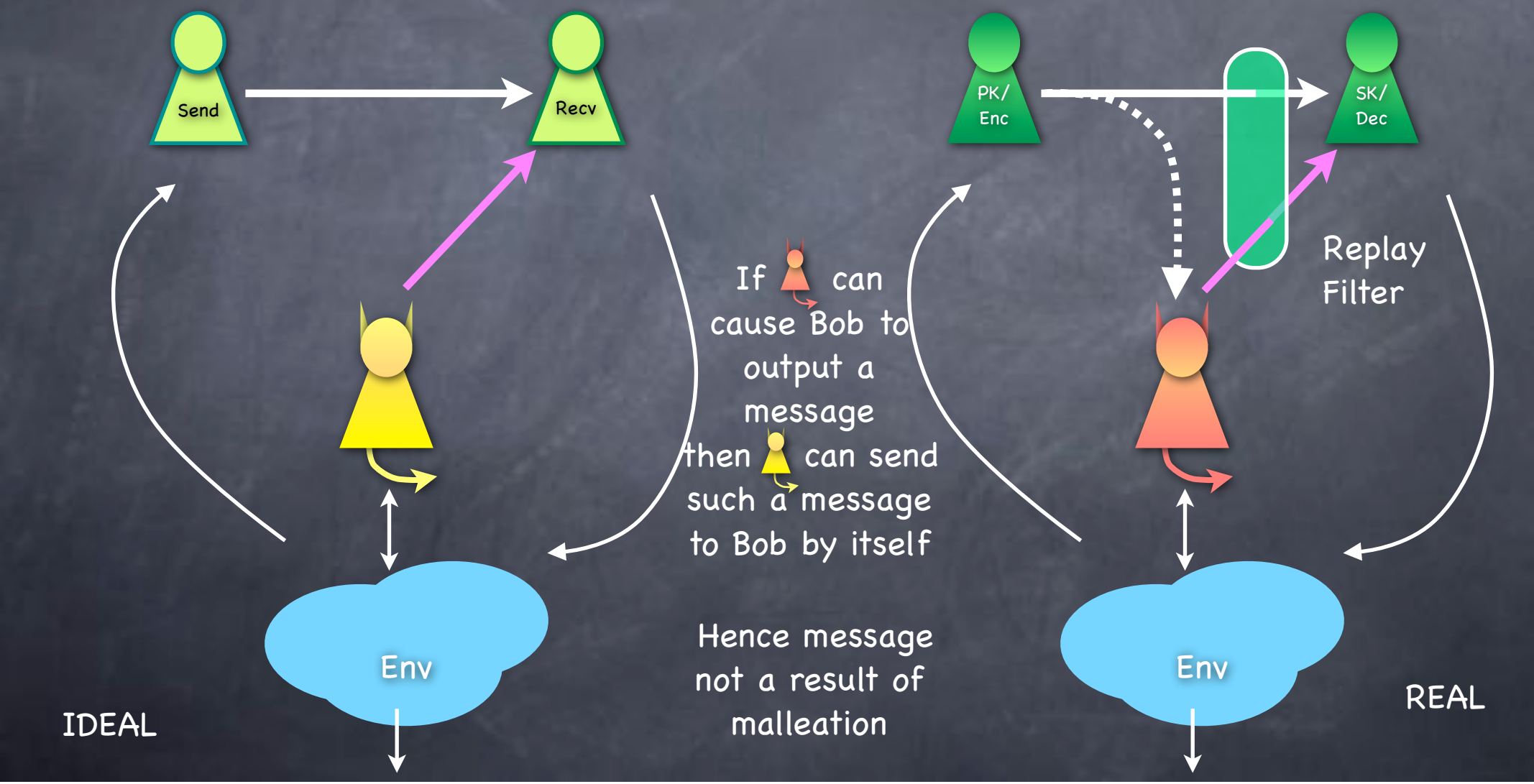

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- Significant efficiency gain using "Hybrid Encryption"

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    - $C = (g_1^x, g_2^x, MY^x)$ and $S = (WZ^{H(C)})^x$
    - g_1, g_2, Y, W, Z part of PK
      - $Y = g_1^{y1} g_2^{y2}$, $W = g_1^{w1} g_2^{w2}$, $Z = g_1^{z1} g_2^{z2}$. (y_i,w_i,z_i) in SK
  - Trapdoor: Using SK, and (g_1^x,g_2^x) can find Y^x, W^x, Z^x
    - If (g_1^x,g_2^x) "not good", "Y^x, W^x, Z^x" vary with different SKs
  - Decryption: Check S (assuming (g_1^x,g_2^x) good) and extract M

Multiple SKs can explain the same PK (unlike El Gamal)

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  - Part of RSA Cryptography Standard (PKCS#1 Ver 2.1). Commonly used in SSL/TLS implementations

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    - Relatively low overhead on top of the (fast) SKE encryption

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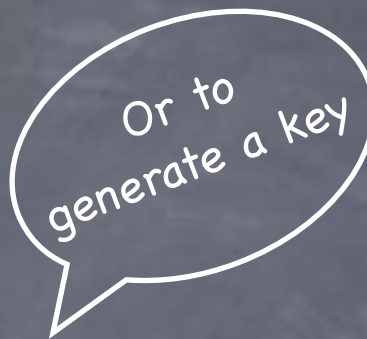

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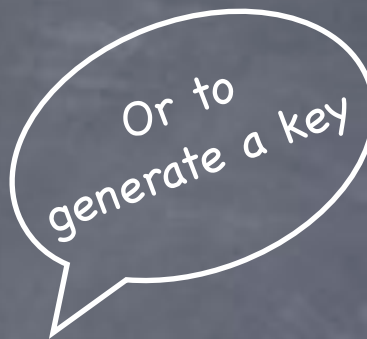

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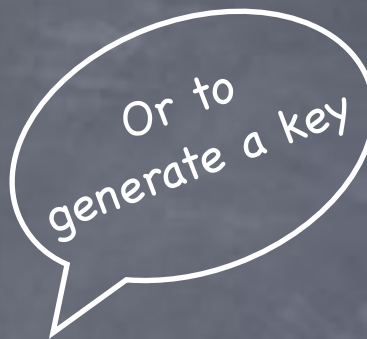

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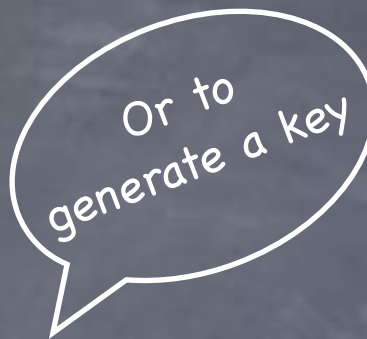

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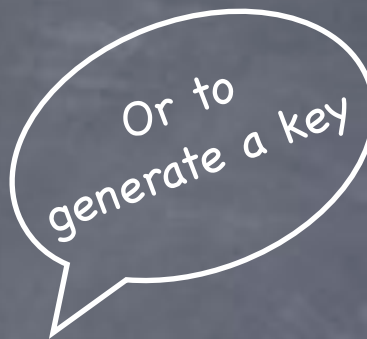

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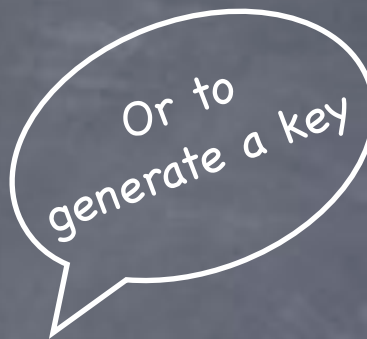

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  - Less security sufficient: KEM used to transfer a random key; DEM uses a new key every time.

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- CCA security based on strong (non-standard) assumptions involving Hash and the group: "Oracle Diffie-Hellman Assumption"

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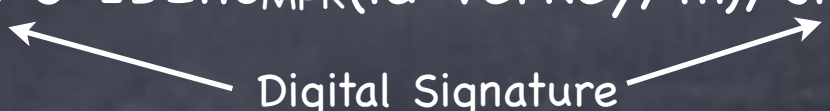

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