# Playing "Spot the Difference" with Springer

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CRYPTO 2011 Rump Session

# Recalling "Spot the Difference" games



Source: http://games2rule.com/

Setup:

- Take a document (e.g., a picture).
- Introduce N errors.
- Publish alternate next to the original and tell the player to find the N differences.

"Spot the difference" games for LNCS authors

If you want to play:

- write a paper
- get it accepted at a conference with LNCS proceedings
- send your camera-ready paper to Springer's "Scientific Publishing Services" (SPS).
- wait for the "final" version of your paper and start comparing.

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Features:

- The number of errors N will be much higher than in any small flash game on your smart phone.
- You won't know N in advance.
- You can play several rounds.

# Example

- Players: Dan, Tanja, and I.
- Challenge document: article on Smaller decoding exponents: ball-collision decoding

We had the pleasure of playing  $\underline{3 \text{ rounds}}$  in which we found  $\underline{34}$ , 14, and 1 errors, respectively.

#### References

- Adams, C.M., Meijer, H. Scemits related symmetric regarding McElicce's publickey cryptosystem. In Crypto 1987 Juol. 40 pp. 224–228 (1987); see also newer version?
  Citations in The document's related comments regarding McElicce's publicling and the second symmetry of the s
- [2] Adams, C.M., Meijer, H.: Security-related comments regarding McElicec's publickeycryptosystem LEEE Transactions on Information Theory 33, 454–455 (1988); see also cutter version [11] Citations in this document: §1, §4

## Round 2:

#### References

- Adams, C.M., Meijer, H.: Security-related comments regarding McEliece's publickey cryptosystem. In: Crypto87 460, pp. 224–228 (1987); see also newer version [2]. Citations in this document: []
- [2] Adams, C.M., Meijer, H.: Security-related comments regarding McEliece's publicwycryptosystem IEEE Transactions on Information Theory 33, 454–455 (1988); see also differ version [1]: Citations in this document: [1] [4]

- [3] Al Jabri, A.: A statistical decoding algorithm for general linear block codes. In: IMA 2001, vol. 3] pp. 1–8 (2001); Citations in this document §4
- [4] Ashikhmin, A.E., Barg, A.: Minimal vectors in linear codes. IEEE Transactions on Information Theory 44, 2010–2017 (1998); Citations in this document. §4
- [5] Barg, A., Krouk, E.A., van Tilborg, H.C.A.: On the complexity of minimum distance decoding of long linear codes. IEEE Transactions on Information Theory 45, 1392–1405 (1999); Citations in this documer [44, §4, §4, §4, §4].
- [6] Batten, L., Safavi-Jensi, R. (eds.) ACISP 2000 LNCS, vol. 4058. Springer, Heidelberg (2006) Sec [43]
- Bernstein, D.J., Bernmann, J. Dahmen, E.: Post-quantum cryptography. Springer, Heidelberg (2009) Sc [44]
- [6] Bernstein, D.J., Lange, T., Peter, Attacking and defending the McEllece cryptosystem. In: PQCrypto 2009. vol. 14, pp. 31-46 (2008), http://eprint.iacr.org/2008/318] Citations in this document §1, §1, §3, §3.
- Bernatein, D.J., Lange, T. Paters, C.: Smaller decoding exponents: ball-collision (c-coding full version) (st), edua 100(10), http://eprint.iacr.org/2010/585] Cltations in this document (17, 37, 8)
- [10] Bernstein, D.J., Lange, T., Peters, C., van Tilborg, H.C.A.: Explicit benads for generic decoding algorithms for code-based cryptography. WCC 2006 5 (2009); Citations in this document: §5
- [11] Berson, T.A.: Failure of the McEliece public-key cryptosystem under messageresend and related-message attack. Crypto 199 (33) 213-220 (1997); Citations in this document: §1)
- [12] Blaum, M., Farrell, P.G., van Tilborg, H.C.A.: Information, coding and mathematics. Kluwer International Series in Engineering and Computer Science, vol. 687. Kluwer, Dordrecht (2002) Sef [53]
- [13] Brent, R.P., Kung, H.T.: The area-time complexity of binary multiplication. Journal of the ACM 28, 521-534 (1990). http://www.aths.au.edu.au/-brent/pab/pub66-html Citations in this document [86]
- [14] Buchmann, J., Ding, J.: <u>Croceedings of the Jost-quantum cryptography</u>, second international workshop, PQCrypte 2008, Cincinnati, OH, USA, October 17-19. Springer, Heidelberg (2008), Set [8] LNCS volume vanished!
- [15] Camion, P., Charpin, P., Haran, S.: Eurocode 1992: proceedings of the international symposium on coding theory and applications held in Udine, October 23-30. Springer, Heidelberg (1993), 58 (20)
- [16] Canteaut, A., Chabanne, H.: A further improvement of the work factor in an attempt at breaking McElicce's cryptosystem. In: EUROCODE, vol. 99(21) (1994), http://www.inria.fr/rrrt/rr-2227.html] Citations in this document [§]
- [17] Canteaut, A., Chabaud, F.: A new algorithm if <u>dring liminum-weight</u> words in a linear code: application to McElicev's cryptosystem and to narrow-sense BCH codes of height 511. IEEE Transactions on Information Theory 44, 367–378 (1998). [Phys.Rev. B 10, 100 (1998)] [Ph
- [18] Cantout, A. Sendrier, N.: Cryptanalysis of the original McEliece cryptosystem. Asiacrypt 195242 187–199 (1998)
- [19] Chabanne, H., Courteau, B.: Application de la méthode de décodage itérative d'Omura à la cryptanalyse du système de McEliece. Université de Sherbrooke, Rapport de Recherche, vol. 122 (1993); Citations in this document, §4.)

## Round 2:

- [3] Al Jabri, A.: A statistical decoding algorithm for general linear block codes. In: IMA 2001 31, pp. 1–8 (2001); Citations in this document: 44
- [4] Ashikhmin, A.E., Barg, A.: Minimal vectors in linear codes. IEEE Transactions on Information Theory 44, 2010–2017 (1998); Citations in this document:
- [6] Batten, L., Safavi-Naini, R. (1987): Proceedings of the 11th Australasian conference on Information security and Privacy, ACISP 2009; Melbourne, Australia, July 35. LNCS, vol. 4058. Springer, Heidelberg (2006); See [43]
- Bernstein, D.J., Buchmann, J., Dahmen, E.: Post-quantum cryptography. Springer, Heidelberg (2009); See 44
- [8] Bernstein, D.L. Lance, T., Peters, C.: Attacking and defending the McElicec reprovested In: PQCrypto 2008 [13], pp. 31-46 (2008), http://oprint.iacr.org/2008/318] Citations in this document: [1] [1]
- Bernstein, D.J., Lange, T., Peters, C.: Smaller decoding exponents: ball-collision decoding (full version) (2010), http://eprint.iacr.org/2010/585
  Citations in this document: 17 17 18
- [10] Bernstein, D.J., Lange, T., Peters, C., van Tilborg, H.C.A.: Explicit bounds for generic decoding algorithms for code-based cryptography. WCC 2009 (2009); Citations in this document: §
- [11] Berson, T.A.: Failure of the McElicce public-key cryptosystem under messageresend and related-message attack. Crypto 1997 [33], 213–220 (1997); Citations in this document: 10
- [12] Blaum, M., Farrell, P.G., van Tilborg, H.C.A.: Information, coding and mathematics. Kluwer International Series in Engineering and Computer Science, vol. 687. Kluwer, Dordrecht (2002); See [53]
- [13] Brent, R.P., Kung, H.T.: The area-time complexity of binary multiplication, Journal of the ACM 28, 521–534 (1981). [http://wwmaths.au.edu.au/~brent/pub/pub055.html] Citations in this document: 60
- [14] Buchmann, J., Ding, J. (eds.): PQCrypto 2008. LNCS, vol. 5299. Springer, Heidelberg (2008); see 8
- [15] Camion, P., Charpin, P., Harari, S.: Carocode 1992 proceedings of the international symposium on coding theory and applications held in Udine, October 23-30. Springer, Heidelberg (1993), See [20]
- [16] Canteaut, A., Chabanne, H.: A further improvement of the weak factor in an attempt at breaking McElicec's cryptosystem. In EUROCODE 1999 [21] (1994), http://www.inria.fr/rrrt/rr-2227.html] Citations in this document:
- [17] Canteaut, A., Chabaud, F.: A new algorithm for finding minimum-weight words in a linear code application to McElicee's cryptosystem and to narrow-sense BCH codes of length 511. IEEE Transactions on Information Theory 44, 367–378 (1998), [Tp://Ttp.inria.tr/INRIA/tech-reports/RR/R8-2685.pa.g2] Citations in this document: 33 10
- [18] Canteaut, A., Sendrier, N.: Cryptanalysis of the original McEliece cryptosystem. In: Asiacrypt '98 [42], pp. 187–199 (1998) [3] [4]
- [19] Chabanne, H., Courteau, B.: Application de la méthode de décodage tiérative d'Omura á la cryptanalyse du système de McEliece. Université de Sherbrooke, Rapport de Recherche, vol. 122 (1993); Citations in this document: 4

- [20] Chabaud, F.: Asymptotic analysis of probabilistic algorithms for .nding hort code-words [15], 175–183 (1993); Citations in this document: §4
- [21] Charpin, P.: Livre des r.esum.el/UROCODE 1994. Abbaye de la Bussi.ere sur Ouche, France (1994)
- [22] Clark Jr., G.C., Bibb Cain, J.: Error-correcting coding for digital communication, Plenum (1981); Citations in this document: §4
- [23] Coffey, J.T., Goodman, R.M.: The complexity of information set decoding. IEEE Transactions on Information Theory 35, 1031–1037 (1990); Citations in this document: §4
- [24] Coffey, J.T., Goodman, R.M., Farrell, P.: New approaches to reduced complexity decoding. Discrete and Applied Mathematics 33, 43–60 (1991); Citations in this document 44, 85
- [25] Wolfmann, J., Cohen, G. eds.) Coding Theory 988. LNCS, vol. 388. Springer, Heidelberg (1989) Soc [50]
- [26] Dumer, I.I.: Two decoding algorithms for linear codes, Problemy Peredachi Informatsii, vol. 25, pp. 24–32 (1989); Citations in this document: 34
- [27] Dumer, I.I.: On minimum distance decoding of linear codes. In [32] 50–52 (1991); Citations in this document §4
- [28] Finiasz, M., Sendrier, N.: Scourity bounds for the design of code-based cryptosystems. In: Asiacrypt 2009 (vol. 40) 2009). <u>http://doprint.iacr.org/2009/414</u> Cltations in this document and 54, 54, 54, 56, 52, 38, 58, 58
- [29] van Tilburg, J.: On the mcElicce Jublic-key cryptosystem. In: Goldwasser, S. (ed.) CRYPTO 1988, LNCS, vol. 403, pp. 119–101, Springer, Heidelberg (1990)
- [30] Gunnier, C.L.: In: Advances in cryptology [EUROCRYPTD1988, Proceedings of the Workshop on the Theory and Application of Cryptographic Techniques Held in Davos. LNCS, vol. 330, Springer, Berlin (1988), Sec [38].
- [31] Honary, B.: Cryptography and coding: proceedings of the 8th IMA international conference held in Circneester. LNCS, vol. 2260. Springer, Heidelberg (2001), See [3]
- [32] Kabatianskii, G.A.: Fifth joint Soviet-Swedish international Workshop on Information Theory, Moscow 1991 (1991), Sec [27]
- [33] Kaliaki Lr, B.S.: Proceedings Advances in <u>contrology</u>(CRVPTC0097). 7th annual internation cryptology conference INCS Santa Barbara. California, USA, August 1724, vol. 1294. Springer, Heidelberg (1997). Sc[11] LNCS volume deleted!
- [34] Kim, I.: Public key cryptography: proceedings of the diffinitemational work-shop on practice and theory in public key cryptosystems (PKC 2001) held on Chapu Island. LNCS, February 13-15, vol. 1992. Springer, Heidelberg (2001), Sei (361)
- [35] Kleinjung, T., Aoki, K., Franke, J., Lenstra, A.K., Thomé, E., Bos, J.W., Gamiry, P., Kruppa, A., Montgomery, P.L., Osvik, D.A., te Riele, H., Timofeev, A., Benemmann, P.: Factorization of a 768-bit RSA modulus. In: Cypto 2010, Qol. 43 pp. 332, 350 (2010), http://oprint.iacr.org/2010/006] Citations in this docuneme [8]
- [36] Kobara, K. Imai, H.: Semantically secure McEliece public-key cryptosystems[conv:sions for McEliece PKC. In: PKC 2001, vol. 4, pp. 19–35 (2001); Crations in this document [§1]
- [37] Krouk, E.A.: Decoding complexity bound for linear block codes. Problemy Peredachi Informatsii 25, 103–107 (1989); Citations in this document §4, §4
- [38] Lee, P.J., Brickell E.P., An observation on the security of mcElicecol phillin-key cryptosystem. In Günther, C.G. ed. CHROCRYPT 1988 LNCS, vol. 330, pp. 275–280. Springer, Heidelberg (1988); Citations in this document[54]

## Round 2:

- [20] Chabaud, F.: Asymptotic analysis of probabilistic algorithms for finding short code-words. In: 15, 175–183 (1993); Citations in this document: [4]
- [21] Charpin, P.: Livre de résume -- DUROCODE '94. Abbaye de la Bussière sur Ouche France (1994) See [16]
- [22] Clark Jr., G.C., Bibb Cain, J.: Error-correcting coding for digital communication, Plenum (1981); Citations in this document: 4
- [23] Coffey, J.T., Goodman, R.M.: The complexity of information set decoding. IEEE Transactions on Information Theory 35, 1031–1037 (1990); Citations in this document: 33
- [24] Coffey, J.T., Goodman, R.M., Farrell, P.: New approaches to reduced complexity decoding. Discrete and Applied Mathematics 33, 43–60 (1991); Citations in this document: [3] §3
- [25] Cohen, G.D., Wolfmann, J. (eds.): Coding Theory and Applications. LNCS, vol. 388. Springer, Heidelberg (1989); See 50
- [26] Dumer, LL. Two decoding algorithms for linear codes, Problemy Peredachi Informatsi vol. 25, pp. 24–32 (1989); Citations in this document: 41
- [27] Dumer, I.I.: On minimum distance decoding of linear codes. In: <u>32</u>, 50–52 (1991); Citations in this document: <u>41</u>
- [29] Goldwasser, S. (ed. Proceeding of Crypto SLNCS, vol. 403. Springer, Heideldelberg (1990); Sec 51
- [30] Günther, C.G. (ed.): Advances in Cryptology EUROCRYPT '88. LNCS, vol. 330. Springer, Heidelberg (1988); See [38]
- [31] Honary, B.: Cryptography and coding: proceedings of the 8th IMA international conference held in Cirencester. LNCS, vol. 2260. Springer, Heidelberg (2001); See [3]
- [32] Kabatianskii, G.A.: Fifth joint Soviet-Swedish international Workshop on Information Theory, Moscow 1991 (1991); See 27
- [33] Kaliski Jr., B.S. (ed.): Advances in Cryptology CRYPTO '97: 17th Annual International Cryptology Conference. LNCS, vol. 1294. Springer, Heidelberg (1997), doi:10.1016/j.jcs.1016.
- [34] Kim, (--, --].): PKC 2001: Proceedings of the 4th International Workshop on Practice and Theory in Public Key Cryptosystems (PKC 2001). LNCS, vol. 1992. Springer, Heidelberg (2001); See 36
- [35] Kleinjung, T., Aoki, K., Franke, J., Lenstra, A.K., Thomé, E., Bos, J.W., Gaudry, P., Kruppa, A., Montgomery, P.L., Osvik, D.A., te Riele, H., <u>Timofeev</u>, A., Zimmermann, P.: Pactorization of a <u>768-bit</u> RSA modulus. In Crypto 2010 48, pp. 333–350 (2010).

http://eprint.iacr.org/2010/006 Citations in this document:

- [36] Kobara, K., Imai, H.: Semantically secure McElicec public-key cryptoxystem onversions for McElicec PKC. In: PKC 2001 [34], pp. 19–35 (2001); Citations in this document: III
- [37] Krouk, E.A.: Decoding complexity bound for linear block codes. Problemy Peredachi Informattii 25, 03–107 (1989); Citations in this document: 41 41
- [38] Lee, P.J., Brickell, <u>Elements of the security of Medicee's public-key cryptosystem. In: Ginther, C.G. (ed. EUROCRYPT 1989 [60]. LNCS, pp. 275–280. Springer, Heidelberg (1988); Citations in this document: 41</u>

- [39] Leon, J.S.: A probabilistic algorithm for computing minimum weights of large error-correcting codes. IEEE Transactions on Information Theory 34, 1354–1359 (1998); Citations in this document: §4
- [40] Matsui, <u>M.</u>: Disceedings of the Advances in cryptology (ASACRYPT 2009, 15th international conference on the theory and application of cryptology and information security, Tokyo, Japan, December 6-10, vol. 5912. Springer, Heidelberg (2009), See [28] LNCS volume disappeared!
- [41] McEliece, R.J.: A public-key cryptosistem based on algebraic coding theory. IPL DSN Progress Report, 114–116 (1978).
- http://ipnpr.jpl-masa.gov/progress\_report2/42-44/44W/NEd ... disappeared! [42] Ohta, K., Per D.: Advances in cryptology [ASDACRY]C 1999 proceedings of the
- [42] Ohta, K., Pec D.: Advances in crystology/ASD-CRV1 [1995] proceedings of the international conference on the theory and application of cryptology and information security held in Beijing, LNCS, vol. 1514. Springer, Heidelberg (1998)
- [43] Overbeck, R.: Statistical decoding revisited. In: ACISP 2006 vol. 6, pp. 283–294 (2006); Citations in this document: §4
- [44] Overbeck, R., Sendrier, N.: Code-based cryptography. In: [7] vol. 4, pp. 95–145 (2009); Citations in this document: §2, §4
- [45] Peters, C. Information-set decoding for linear codes over Fq. Post-Quantum Cryptography 49,81–94 (2010); Citations in this document: 51–64, §2
- [47] Prange, E.: The use of information sets in decoding cyclic codes. IRE Transactions on Information Theory IT 5, 5–9 (1962); Citations in this document: §4.
- [4] Rabin, T. (ed.): Advance in cropping (C)YPTO 2010, 30th annual cryptology conference proceeding. LNCS, Anth Barbara, CA, USA, vol. 6223. Springer, Heidelberg (2010). See 535
- [49] Sendrier, N. (ed.): Proceedings of the Rest quantum cryptography, third international workshop, PQC-spin LNCS, Projnstadt, Germany, May 25-28, vol. 6061. Springer, Heidelberg (2010), Soc. 431
- [50] Stern, J.: A method for finding codewords of small weight. In: [25], pp. 106–113 (1989); Citations in this document: §1, §3, §3, §4, §4
- [51] van Tilburg, J.: On the McEliece public-key cryptosystem. In: Crypto 1988, Jol. pp. 119–131 (1990); Citations in this document: §4
- [52] van Tilburg, J.: Security-analysis of a class of cryptosystems based on linear errorcorrecting codes, Ph.D. thesis, Technische Universiteit Eindhoven (1994); Citations in this document: §4
- [53] Verheul, E.R., Doumen, J.M., van Tilborg, H.C.A.: Sloppy Alice attacks! Adaptive chosen ciphertext attacks on the McElice public-key cryptosystem. In: [12], pp. 99–119 (2002); Citations in this document: §1

### Round 2:

- [39] Leon, J.S.: A probabilistic algorithm for computing minimum weights of large error-correcting codes. IEEE Transactions on Information Theory 34, 1354–1359 (1988); Citations in this document: 41
- [40] Matsui, M. (ed.): Advances in Cryptology SIACRYPT '09 LNCS, vol. 5912. Springer, Heidelberg (2009); See [28]
- [41] McEliece, R.J.: A public-key cryptosystem hased on algebraic coding threy, PPL DSN Progress Report, 114-116 (1978) http://ipnpr.jpl.masa.gov/progress\_report2/42-44/44N.PDF Citations in this document: 11 41
- [42] Ohta, K., Pei, D. (eds.): Advances in Cryptolog -- ASIACRYPT '98. LNCS, vol. 1514. Springer, Heidelberg (1998); See 18
- [43] Overbeck, R.: Statistical decoding revisited. In: ACISP 2006 [6], pp. 283–294 (2006); Citations in this document: [4]
- [44] Overbeck, R., Sendrier, N.: Code-based cryptography. In: 7, pp. 95–145 (2009); Citations in this document: 22 41
- [45] Peters, C.: Information-set decoding for linear codes over F<sub>q</sub>. Post-Quantum Cryptography [49], 81–94 (2010); Citations in this document: [1] [4] [2]
- [46] Pomerance, C. (ed.): cryptology --CRYPTO '87. LNCS, vol. 293. Springer, Heidelberg (1988) http://dss.csie.nctu.edu.tw/research/crypto/HTML/PDF/C87/224.PDF] See III
- [47] Prange, E.: The use of information sets in decoding cyclic codes. IRE Transactions on Information Theory IT-8, <u>S5-S9 (1062</u>); Citations in this document: 41
- [48] Rabin, T. (ed.): cryptology CRYPTO LNCS, vol. 6223. Springer, Heidelberg (2010); See 35
- [49] Sendrier, N. (ed.): Post-Quantum Cryptography. LNCS, vol. 6061. Springer, Heidelberg (2010); See 45
- [50] Stern, J.: A method for finding codewords of small weight. In: 25, pp. 106–113 (1989); Citations in this document: 11 (3) (3) (4) (4)
- [51] van Tilburg, J.: On the McEliece public-key cryptosystem. In: Crypto '88 [29], pp. 119–131 (1990); Citations in this document: 41
- [52] van Tilburg, J.: Security-analysis of a class of cryptosystems based on linear errorcorrecting codes, Ph.D. thesis, Technische Universiteit Eindhoven (1994); Citations in this document: 41
- [53] Verheul, E.R., Doumen, J.M., van Tilborg, H.C.A.: Sloppy Alice attacks! Adaptive chosen ciphertext attacks on the McElicee public-key cryptosystem. In: [12], pp. 99–119 (2002): Citations in this document: [1]

# My favorites (spoiler alert)

Renaming conferences

- ASIACRYPT 2009  $\rightarrow$  ASIACRYPT '09.
- CRYPTO'87  $\rightarrow$  CRYPTO 1987

Extra fun: try entering "CRYPTO 1987" and "ASIACRYPT 09" on http://www.springerlink.com/ and see if you can find the proceedings.

Reversing the order of authors/editors:

- Cohen, G., Wolfmann, J. (eds.): Coding theory and applications.  $\rightarrow$ 
  - [25] Wolfmann, J., Cohen, G. (eds.): Coding Theory 1988. LNCS, vol. 3

Can introduce more errors by copy/paste-ing the whole bibliography from the submitted PDF and editing it (rather than using the submitted LaTeX source code):

• A new algorithm for \_nding minimum-weight words in

Can introduce more errors by copy/paste-ing the whole bibliography from the submitted PDF and editing it (rather than using the submitted LaTeX source code):

- A new algorithm for \_\_nding minimum-weight words in
- codewords  $\rightarrow$  code-words.

# All-time favorite

A bib entry which should look like:

Charpin, P. (ed.): EUROCODE '94 – Livre des résumé – EUROCODE '94, Abbaye de la Bussière sur Ouche, France, October 1994 (1994); See [16]

# All-time favorite

A bib entry which should look like:

Charpin, P. (ed.): EUROCODE '94 – Livre des résumé – EUROCODE '94, Abbaye de la Bussière sur Ouche, France, October 1994 (1994); See [16]

#### Round 1:

[21] Charpin, P.: Livre des r\_esum\_e|EUROCODE 1994. Abbaye de la Bussi\_ere sur Ouche, France (1994)

# All-time favorite

A bib entry which should look like:

Charpin, P. (ed.): EUROCODE '94 – Livre des résumé – EUROCODE '94, Abbaye de la Bussière sur Ouche, France, October 1994 (1994); See [16]

#### Round 1:

[21] Charpin, P.: Livre des r\_esum\_e|EUROCODE 1994. Abbaye de la Bussi\_ere sur Ouche, France (1994)

#### Round 2:

[21] Charpin, P.: Livre des rësumë- - -EUROCODE '94. Abbaye de la Bussiére sur Ouche, France (1994); See [16] In conclusion:

- I usually do not play "Spot the Difference" games because I consider my time too valuable to do so.
- Sadly Springer's SPS doesn't seem to care.