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[Samuel Bak](#) - Luna ^[3]

Dispersion and Distortion, [Kmoch's](#) terms ^{[1] [2]} for [pawn structure weaknesses](#) due to vertical or horizontal splitting caused by [captures](#) or [advancement](#). The proposed functions may be used via an additional scaling or indirection, f.i. to index a table with concrete penalties.

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Dispersion

Dispersion is [Kmoch's](#) term for vertical splitting of pawns (most commonly, isolation) caused by captures. Having three or four [islands](#) while the opponent has one or two - assuming about the same number of pawns for both sides - may be considered in evaluation. But this is also implicitly done by evaluating [double- or triple](#) and [isolated](#) or the balance of weak pawns in general. Some arbitrary dispersion measure, intended as [evaluation](#) term.

```
int dispersion(U64 pawns)
{
    BYTE fileset = (BYTE) soutFill(pawns);
    int ni = popCount(islandsEastFiles(fileset));
    int np = popCount(wpawns);
    return abs(3*ni*ni - np);
}
```

```
}
```

```
BYTE islandsEastFiles(BYTE f) {return f & ((f ^ (f >> 1)));}
```

The higher the worse.

np \	number if islands			
	1	2	3	4
np \	3	12	27	48
1	2	-	-	-
2	1	10	-	-
3	0	9	24	-
4	1	8	23	44
5	2	7	22	43
6	3	6	21	42
7	4	5	20	41
8	5	4	19	40

Distortion

Distortion is [Kmoch's](#) term for horizontal splitting of pawns caused by advances. One may use something like this based on [rearfill](#), xor and [population count](#) to get an idea of distortion. It considers the rank-difference of two file-adjacent pawns (if any) as distortion penalty - the higher the worse. [Half-isolated](#) or even [isolated pawns](#) contribute a distortion penalty according to the size of their rearfill from 2 to 7 for each empty neighboring file, which discourages advancement of such pawns, interacting with terms considering (half-) isolated pawns. Alternatively, for a "reverse" distortion penalty to encourage advancement of half-isolans, one may use [frontfill](#) instead with a slightly different semantic is case of [doubled pawns](#).

```
int wDistortion(U64 wpawns) {
    U64 fill = wRearFill(wpawns); // wFrontFill
    U64 delta = (fill ^ (fill<<1)) & C64(0xfefefefefefefefe);
    return popCount(delta);
}
```

High distortion sample:

```
wpawns          rearFill          rearFill << 1      xor & ~A-
```

[illegible]

ts

- Isolated Pawn
- Isolated Pawns (Bitboards)
- Pawn Islands
- Pawn Islands (Bitboards)

- [Pawn Power in Chess by Hans Kmoch - Glossary of Terms - Chess Forums - Chess.com](#)
- [Monsoon/Typhoon Homepage](#) by [Scott Gasch](#)
- [Dispersion from Wikipedia](#)
- [Distortion \(disambiguation\) from Wikipedia](#)

1. [^ Hans Kmoch \(1959, 1990\). *Pawn Power in Chess*. New York: Dover, 1990. Previous ed.: New York: McKay, 1959. ISBN 0-486-26486-6](#)
2. [^ Pawn Power in Chess by Hans Kmoch - Glossary of Terms - Chess Forums - Chess.com](#)
3. [^ Chess in the Art of Samuel Bak, Center for Holocaust & Genocide Studies, University of Minnesota](#)

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