

External versus Internal Ko

(c) Robert Jasiek <jasiek@snaflu.de>; version 1; last update 2008-11-04; first day 2008-11-04.

Preface

This paper relies on the paper Types of Basic Ko. The examples use positional superko and 2 ending passes. The considered kos are marked.

New Fundamental Definitions

- The *locale* of a ko is the set of its and its adjacent intersections.
- For a ko, a *closed killer* is a closed player who moving first can virtual-force uncapturable life of his on the ko.
- For a ko, a *strong killer* is a closed player who moving first can virtual-force uncapturable life of his on the locale.

Definitions of Ko Types

A ko is *external* if a closed killer exists that is not a strong killer.

A ko is *internal* unless it is external.

Corollaries

Corollary 1:

Each strong killer is a closed killer.

Corollary 2:

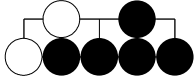
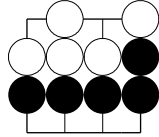
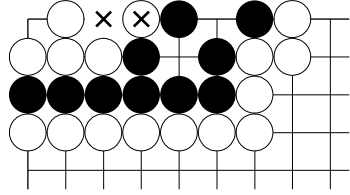
Dead ko, double disturbing death, or fighting ko can be external or internal. Closed death or disturbing life cannot be external.

Solution for the World Mind Sports Games 2008 Rules' Supplementary Ko Rule

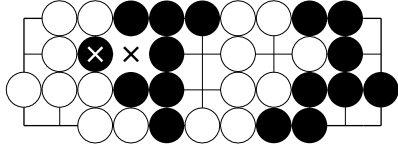
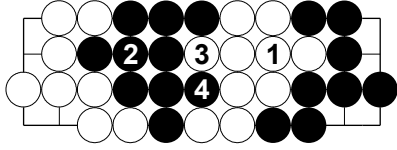
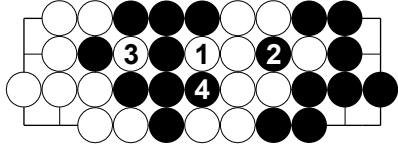
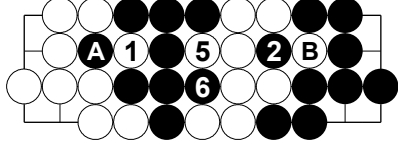
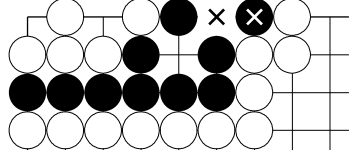
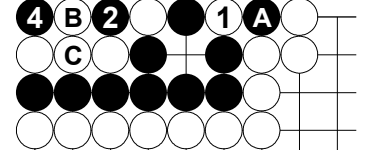
A player may not pass if

- *there is at least one ko on the board that is open for him and neither a disturbing life nor an internal disturbing death and*
- *he has some legal play that is not on a two-eye-formation.*

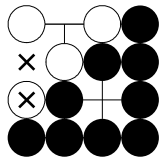
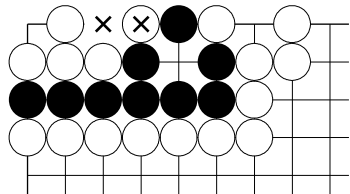
Examples of Internal Dead Kos

 <p>Example 1. Black is a strong killer.</p>	 <p>Example 2. Black is a strong killer.</p>	 <p>Example 3. Black is a strong killer.</p>
---	---	---

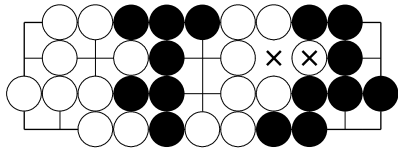
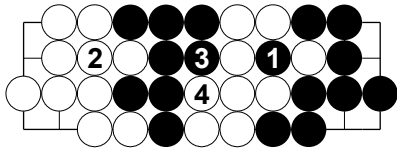
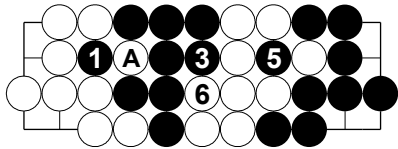
Examples of External Dead Kos

 <p>Example 1. White is a closed killer but not a strong killer.</p>	 <p>White moving first cannot virtual-force uncapturable life of his on the locale because he cannot capture the adjacent black string: Variation 1.</p>	 <p>Variation 2</p>
 <p>Variation 3 ③ at A, ④ at B.</p>	 <p>Example 2. White is a closed killer but not a strong killer.</p>	 <p>③ at A, ⑤ at B, ⑥ at C. White moving first cannot virtual-force uncapturable life of his on the locale because he cannot capture any adjacent black string.</p>

Examples of Internal Double Disturbing Deaths

 <p>Example 1. Black is a strong killer.</p>	 <p>Example 2. Black is a strong killer.</p>	
---	---	--

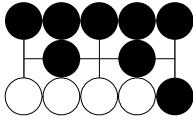
Examples of External Double Disturbing Deaths

 <p>Example 1. Black is a closed killer but not a strong killer.</p>	 <p>Black moving first cannot virtual-force uncapturable life of his on the locale because he cannot capture the adjacent white string: Variation 1.</p>	 <p>Variation 2 ② pass, ④ at A.</p>
---	---	--

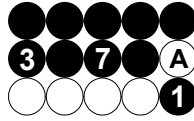
<p>② pass, ④ at A, ⑤ at B, ⑥ at ①. Variation 3</p>	<p>Example 2. White is a closed killer but not a strong killer.</p>	<p>Compare Example 1.</p>
<p>Example 3. White is a closed killer but not a strong killer.</p>	<p>③ at A, ④ at B. White moving first cannot virtual-force uncapturable life of his on the locale because he cannot capture any adjacent black string: Variation 1.</p>	<p>② pass, ④ at A, ⑤ at B, ⑦ at C, ⑧ at D. Variation 2</p>

Examples of Internal Fighting Kos

<p>Example 1. Black and White are strong killers.</p>	<p>Example 2. Black and White are strong killers.</p>	<p>Example 3. Black and White are strong killers.</p>
<p>Example 4. Black and White are strong killers.</p>		
<p>Example 5. Black and White are strong killers.</p>	<p>Example 6. Black and White are strong killers.</p>	<p>Example 7. Black and White are strong killers.</p>

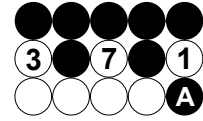


Example 8. Black and White are strong killers.



② pass, ④ at A,
⑤ at ①,
⑥ pass.

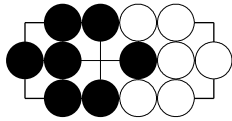
Black is a strong killer. At 5, virtual-force allows Black to recapture immediately.



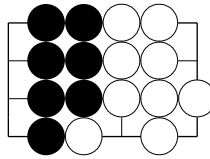
② pass, ④ at A,
⑤ at ①,
⑥ pass.

White is a strong killer. At 5, virtual-force allows White to recapture immediately.

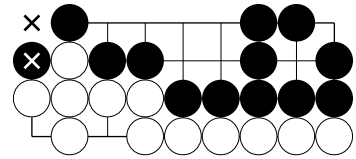
Examples of External Fighting Kos



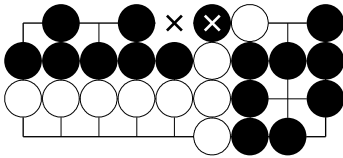
Example 1. Black and White are closed killers but not strong killers.



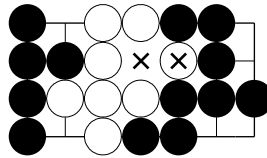
Example 2. Black and White are closed killers but not strong killers.



Example 3. Black is a closed killer but not a strong killer: He cannot capture the adjacent white string.



Example 4. Black and White are closed killers but not strong killers: Black cannot capture the big white string. White cannot capture the upper left black string.



Example 5. Black and White are closed killers but not strong killers.