

## **Infravision & Your Fantasy Hero**

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This article first appeared in DRAGON(R) issue #211 (Nov. 1994) as "Sight in the Darkness"; this file updates and corrects the earlier article.

### *What would it be like to see in the dark?*

My interest in this topic was sparked years ago when I tried to figure out just what my half-orc AD&D(R) game characters could see using infravision in a dungeon. I wanted every advantage there was for those obnoxious little guys. Additionally, I wanted to know just how well infravision-using monsters could see in the dark, because I wanted my characters to avoid being seen and promptly eaten, as a number of them were.

This interest was sparked again recently by an article in a science magazine on infrared vision. Some very intriguing points came to light, and the results are offered here in the hopes that AD&D and D&D(R) game players everywhere will find them useful. (Certainly, my half-orcs would have gotten a longer leash on life with this information.)

### **How infravision "works"**

We should really start with a look at real-world infrared light and infravision. This makes certain game aspects of this sensory power clearer, and also highlights inaccurate, contradictory, and problematic aspects of infravision in game play (which will be discussed in depth later).

The science article that fired me up for this topic was "Seeing the World Through Infrared Eyes," by Neil F. Comins (*Astronomy Magazine, June 1991, pages 50-55*). This excellent piece covers the basics of how infravision would work in realistic terms. It's worth hunting for this article in your local library and copying it for reference. That and a few encyclopedic entries are the basis for the information that follows.

Infrared radiation is normally invisible, lying just below red on the electromagnetic spectrum. It is given off by hot objects; the hotter the object, the more infrared light it gives off. Very hot objects eventually give off visible light--red light at first, then orange, yellow, and white as the heat increases. We can sense heat radiation on our skin, the largest sensory organ we have, but we cannot detect more than a general direction of the heat source and an idea of how hot the source must be.

Certain snakes called pit vipers are able to detect infrared light more accurately than we can, though only within a short range. Several sense organs called pit organs lie to either side of a pit viper's head, between the eye and nostril. Changes in heat radiation as little as 1 degree can be detected. The snake senses the direction of the heat source by moving its head back and forth, noting the direction and intensity of the heat it senses.

We've known about heat for eons, but infrared light itself was discovered by an English astronomer, Sir William Herschel, in 1800. A very practical use for infrared light was found during World War II, when electric sniperscopes were invented. Sniperscopes were attached to rifles and

gathered distant infrared light coming from the bodies of soldiers, converting it to visible light for the sharpshooter. This allowed sharpshooters to fire on enemy positions at night. (As will become apparent, some versions of infravision in the AD&D game were based on sniperscope characteristics.)

Infrared light has less energy than visible light, but it behaves in much the same way. Some infrared radiation is absorbed by molecules in the air. However, near-infrared light, which is the part of the infrared spectrum closest to visible red light, is reflected by most objects and thus can be used to detect them. We see a chair by the light reflected from it; a pit viper can detect nearby objects by the near-infrared heat reflected or emitted from them.

Our ability to actually see infrared heat in detail is blocked by several major problems. Because infrared light is less energetic than visible light, a human able to see near-infrared light clearly would need eyes about 5-10 times larger than normal. Worse, heat is emitted from many objects all around us; stoves, furnaces, living beings, light bulbs, hot car engines, and sun-warmed rocks, concrete, bricks, and asphalt for example. Almost everything with any warmth would glow as if it were a light bulb, though with an intensity proportionate to how hot it was. Thus, an oven will be "brighter" than a warm rock.

What this means, of course, is that anyone able to see infrared light also will see his own body warmth. We have body temperatures just below 100 degrees F., which is enough to blind us with heat radiation. It's like trying to take a picture when the camera itself emits light inside and out, ruining the film.

To prevent such heat blindness, an infravision-using creature would need some sort of insulation around its eyeballs to keep the body's heat out of them, and some kind of refrigerant to keep the eyeballs cool so they become sensitive to outside light. This insulation and refrigeration would be done biologically. (Don't ask me exactly how, but I'm sure Mother Nature would figure out a way.) However, let's face it: We're dealing with magic, not science, and magic can do anything. Our problems are solved at a stroke, even if it doesn't please the scientists among us.

Another option--useful for beholders, giant snails, and crabs--is to put the eyeballs on stalks, separating them from the rest of the body. The eyes are thus air cooled, so no other refrigerant is needed. I don't think beholders and so forth have infravision, though (as is noted later) if they've lived underground for a long time, they've probably developed it.

In some ways, the way that infravision is described in the AD&D game rules implies that it works in the same way that our night vision normally works. Rod-shaped cells in the retina of your eyes can detect very dim light after a short period of adjustment to darkness, which you should be familiar with each time you go into a dark room. At first you can't see a thing, but over a period of minutes you start to see more and more objects in what little light there is. Eventually, faint light sources like the full moon, digital clocks, and even pure starlight can seem quite bright, even painfully so. However, because rod cells are not color-sensitive like the eye's cone cells, night vision is mostly black-and-white vision; maybe "shades of gray" vision is more accurate. (Infravision was described as being like black-and-white vision in the original AD&D game, too, as noted later.)

Night vision can be instantly spoiled by bright normal light, which is why driving experts tell you

to look away from oncoming cars at night, to preserve your eyes' sensitivity. Infravision in the AD&D game is spoiled by bright visible light, extremely hot objects like fires, and magical light. Perhaps fantasy creatures with infravision have magical cells in their eyes that work like rods, but pick up heat instead of faint visible light. Who knows?

So much for how infravision works. What can you see with it?

### **The infravisual world: Aboveground**

We'll assume that your campaign world resembles our own Earth in that it has a normal day-night cycle with a sun like our own. (If this is not the case, you can make adjustments as we go along.) What would your heat/infrared picture of the world look like, then? Let's use some logic as we look around.

In the daytime in summer, everything bathed in sunlight is warm. Things that retain heat well, like large rocks, will be warmer and stay warmer longer than things that lose heat rapidly in cool winds, like thin leaves or blades of grass. The greatest normal heat source is the sun, which we can easily assume is too bright to look at with any form of infravision. Sunlight in fact ruins AD&D game infravision, so we would rely on normal vision alone. Air is assumed to be invisible, whatever its temperature, unless it is extremely hot (see below).

So infravision is useless in broad daylight. Once darkness falls, however, the landscape is still hot. Objects retain heat from the sun and radiate it slowly away, which keeps the night side of the world from freezing. (Even magical worlds need thermodynamic physics!) With the sun gone, a creature with very good infravision could see almost normally right after full darkness falls, since the terrain will radiate light. We can assume that a combination of rod-based night vision and magic-based infravision would be a potent mix, allowing vision about equal to normal sight in full daylight. Distant images would be fuzzier and less distinct than usual, so a far-away orc might look like an ogre or a halfling, but it beats seeing nothing at all.

Different parts of the landscape will cool off at different rates, so things will look strange. Rocks would be "brighter" than trees, for instance. Water is generally cooler than land, but water also retains heat better than land; thus lakes and seas might seem "brighter" than the shoreline, especially late at night. Very hot air, such as that escaping from chimneys or fires, will glow faintly like a luminescent cloud.

Other warm things in the world include live animals, especially the warm-blooded ones, and fire. A deer, a human, and a chipmunk all radiate heat--more heat when they are ill or physically exerting themselves, less heat when standing still or asleep. Certain magical animals, such as salamanders and red dragons, can be assumed to produce much more heat than other creatures their size. I recall reading that drinking alcohol causes the body to radiate more heat than usual, so a drunkard could be detected by being "brighter" than other people.

Objects in close contact with living beings, like clothing, weapons, tools, chairs, and beds, will radiate some heat after the beings leave or discard them. In time, of course, those objects will completely cool off. Standing on a spot or leaning against a wall for a while also will leave residual heat behind, which could be noticed. Scuffing or shuffling feet would leave infrared "footprints"

that could be tracked, though not for long. Friction from dragged objects, like heavy sacks or combat victims, also could be detected, as could places where surfaces have been rubbed together for long periods of time (machine gears, gristmill stones, axle joints, spinning wheels, etc.). Physical blows, like being smacked with an open hand or a blacksmith's hammer, also raise the temperature of solid surfaces for short periods of time.

Fires produce vastly more heat than living beings. Seeing a living being hiding next to a blast furnace in a dark room would be almost impossible, like seeing a firefly's light next to the sun's. Manmade and natural sources of fire include matches, pipes, cigars, candles, torches, campfires, bonfires, hearths, furnaces, forest fires, lava, and embers. All flame sources are assumed to emit enough infrared and visible light to ruin infravision near them. Note however, that a "dead" fire would radiate heat long after the last ember has vanished, and likely would be detectable at a great distance. A forest fire would "light up" the landscape for many hours after the flames are gone.

Remember, too, that infravision also detects the lack of heat, just as normal vision detects the lack of light. Snow and ice will look very dark in infravision if seen without visual light from moons or stars. A cold-producing object like a refrigerator also will look darker than objects around it. Cold-producing creatures like brown mold or a lich (whose frosty touch causes frostbite damage) will look very "black."

It's worth a word on what sorts of creatures could not be seen with infravision. Creatures that are normally able to turn invisible, like pixies, should also be invisible to infravision but not to other senses like smell. Any creature that is roughly the same temperature as its surroundings, like a cold-blooded insect, fish, amphibian, or reptile, would be harder to see at night, though even cold-blooded creatures aren't always exactly the same temperature as the environment around them. (Live things move and so generate friction from moving, for one thing.) Magical beings that radiate no heat at all, like undead skeletons and zombies, would be almost invisible to infravision unless revealed by reflected infrared light or else blocking a much hotter source, revealing their outline.

With so many heat sources at night, and so many things that will reflect infrared light, there will be a multitude of infrared-light shadows. The landscape will lack clarity and seem a bit out of focus (even more so at greater distances), as well as painted in shades of gray. It's a confusing, alien world, but any creature born with infravision would be quite accustomed to it and might instantly recognize any critical feature it sees.

Neil Comins' article notes that the night sky itself would change when seen through infravision, but modern-world astronomy is considerably different from the AD&D game's SPELLJAMMER(R) setting "physics." In essence, any heat source in wildspace will glow fuzzily in infravision, but it's up to the Dungeon Master to choose which things seen in the night sky are heat-emitters and which are not.

Stars, for instance, might radiate only visible light and no heat at all, thus being invisible in infravision but not to normal or night vision. Fire bodies, like suns, will certainly emit enormous amounts of heat and be easily visible from a planet's surface as enormous, brilliant, fuzzy balls in the sky. Air bodies will emit or reflect very little heat (becoming invisible), and earth and water

bodies will only reflect heat (being barely visible unless they are close to a heat source).

Let's take three well-known crystal spheres and see what's to be seen in the infravisual sky. Oerth, home of the GREYHAWK(R) campaign, is set in Greyspace (described in the SPELLJAMMER accessory SJR6 *Greyspace*). The local sun, Liga, is an enormous fire body that will temporarily blind any infravision-using creature dumb enough to look directly at it. Oerth's two moons--Luna (a.k.a. Raenei) and Celene (a.k.a. Kule)--shine clearly by reflected infrared light from Liga, passing through normal lunar phases. Other planets are much farther away and thus much fainter, though some have their own heat source, like the air world, Edill (which has small fire bodies within it). Stars in Greyspace are actually gigantic gemstones set in the crystal sphere itself that emit light but no heat, thus being invisible to infravision.

Krynnspace, home of the DRAGONLANCE(R) setting, has two fire bodies: the sun and Sirion, the small innermost planet. The sun, of course, is staggering bright (just like Liga, above, or our own Sun). Infravision makes Sirion look like the second-brightest body in the sky, however, as it gives off so much more heat than any other planet. Reorx, an earth body that is the second planet out from the sun, is third brightest; it reflects heat from both the sun and Sirion, which often appear widely separated when seen from Krynn. Krynn's three moons also reflect heat from both sources, becoming the fourth, fifth, and sixth brightest bodies. Outer planets reflect less light and are thus dimmer in Krynn "infra-sky." The stars here, as in Greyspace, are invisible to infravision, emitting only light from the quasi-elemental plane of Radiance. DMs should read SJR7 *Krynnspace* for more.

Finally, from the justly famed surface of Toril (home of the FORGOTTEN REALMS(R), Kara-Tur, Horde, Maztica, AL-QADIM(R), and MALATRA(TM) settings), the sun is the dominant object in the "infra-sky." It is interesting to note that Coliar, the second planet out from the sun, is almost invisible because it is an air body; the sun's heat goes right through it. However, because of the small "islands" of rock circling within Coliar, infravision might show the planet to actually be a spherical collection of pinpoints of light, reflecting heat from the sun. Selune (Toril's great moon) and the Tears of Selune (a cluster of asteroidal bodies circling Selune's trailing Lagrange point) shine clearly by reflected heat from the sun, when seen from Toril. Other worlds appear very faint, with the exception of Anadia, an earth body and the closest world to the sun, and Garden, which is illuminated by one of its moons, Sunson, a miniature fire body. Garden's other moons might also show up clearly in infravision through a telescope, reflecting Sunson's heat and light. Again, the stars are infra-invisible. See SJR2 *Realmspace* for more.

Given the above settings, you can see that even when the sun goes down at night, infravision might still reveal a great deal about the surface world if a heat source is still in the sky. Garden's Sunson might be bright enough infravisually to cast shadows at night on Toril, like a full Moon on our Earth. This would be especially true when Garden is in conjunction with Toril (i.e., when it is closest to Toril). Sirion would appear from Krynn to be an extremely bright "morning star" or "evening star" (in the manner of Mercury or Venus, as seen from Earth), but it would also reveal the local landscape quite clearly.

Collisions between celestial bodies will produce brief bursts of infrared light (heat). As asteroids in the Grinder of Greyspace or earth bodies within Krynnspace's air-body Zivilyn collide,

an infravision user elsewhere in local wildspace would see a brief burst of bright light that fades away rapidly.

If a DM is designing an original campaign world using a completely different astronomical set-up, he can use logic and the above examples in designing the "infra-sky" of his world. What about an air body full of nonluminous but very hot gases? A cold air world that eclipses the sun, not reducing visible light but cutting down heat radiation briefly?

You might also consider creating a large selection of infravision-using monsters on your world, with behavioral patterns that vary according to the heat-brightness of the sky. Carnivores, especially, will be more active when they can see clearly.

### **The infravisional world: Underground**

Infravision is remarkable enough to surface-dwelling creatures. Let's look at what it's like for subterranean beings, and what advantages and disadvantages they gain from it.

In our real world, deep caverns tend to have a uniformly cool temperature; Mammoth Cave, in central Kentucky, has an average temperature of 54 degrees F. that varies only slightly year-round. This coolness makes everything look the same, bland shade of gray to an infravision user, but there is plenty of hope here for diversity. For one thing, large openings radiate only faint heat (from objects beyond them), so such openings will look dark. More distant objects radiate less visible heat than closer ones, so distant objects are dimmer and darker. You could thus pick out the shape and direction of an unused tunnel with little trouble.

Running water underground is often extremely cold, so cave water will seem very black, as will the rocks surrounding it. If a cavern complex is near a geothermal heat source, like a geyser or (heavens forbid) volcanic magma, the entire cavern will grow warmer and "brighter" as an infravision-user gets closer to the heat source.

Caves often have a variety of life in them, especially in fantasy worlds, and living beings will radiate enough heat to "infra-illuminate" their surroundings. The more beings, the brighter their living space; a thousand goblins should be able to see their underground lair quite clearly with no other "light" than the heat from their own crowded bodies.

Heat-producing magical creatures, like red dragons, will of course radiate vast amounts of infrared light. A red dragon would have an advantage, too, in that one short puff of flame will ruin the infravision of any approaching creature, with fatal results for the blinded ambushers. Some cold-blooded creatures like slithering trackers would be invisible to infravision, again with fatal results for cocky adventurers. The special dangers of skeletons, clay golems, and other "heatless" monsters become highly apparent.

Some undead, however, radiate cold. Liches, for instance, cause damage from their chilly touch; they and their hands should "glow black" in infravision, standing out against warmer backgrounds, even cave walls. Read the descriptions of monsters carefully if you want to produce a more detailed and intriguing picture of underworld life to adventuring dwarves, gnomes, and elves.

Speaking of fantasy races, a short history of infravision, as it appears in TSR's fantasy games, is in order.

## Infravision and the AD&D game

References to infravision are scattered throughout the AD&D and D&D game rules, but it becomes obvious that the concept underwent much expansion and refinement over the years since either game first appeared. It would help to start out with a look at what infravision used to do in fantasy games and what it does now--as well as collect the rules on infravision together in one spot for ease of reference. A few areas of omission and contradictions that have confused the playing of infravision will become apparent.

Certain races in the *Chainmail* rules (the war-gaming rules from which role-playing sprang) were able to "see well in dimness or dark." Dwarves, gnomes, goblins, kobolds, and orcs, as subterranean races, needed the ability to get around in caves and mines when candles and oil lanterns weren't available. If you dumped the infravision concept entirely, this sort of vision could be either light-intensifying vision, making the most of every visible-light photon in the area, or a form of magical radar, allowing for an accurate map of local surroundings without recognition of color or "flat" things like paintings, handwriting, etc. It could even be magical vision that makes dark areas seem to be lit by sourceless light, so there are no shadows (color is optional). Take your pick.

Hard on the *Chainmail* game's heels in 1974 came the D&D Original Set, those three tan booklets in the white box. There, the *infravision* spell first appeared. The original version of the spell allowed the user to "see infra-red light waves, thus enabling him to see in total darkness." (Of course, you still might not see in total darkness if there were no heat sources around.) The spell lasted for one day and had a range of 40-60 feet. Interestingly, it wasn't until a later D&D supplement appeared (the *Greyhawk* book) that dwarves, gnomes, and elves were noted as having infravision allowing them to see monsters up to 60 feet away in the dark. (Elves were probably allowed this so they could see at night, though light-intensifying vision would have been more logical.)

The original AD&D game's *Player's Handbook* and assorted monster descriptions gave infravision to many creatures, including every demihuman PC race except certain halflings. Different types of infravision began to appear, too, defined by range. Poor infravision was effective only out to 30 feet, and was found in certain halflings and derro, an evil dwarflike race. Normal or standard infravision, good out to 60 feet, was the most common variety. Superior infravision extended out to 90 feet, as was the case with trolls and troglodytes, or 120 feet, for drow and duergar (evil dwarves). In one place (page 102), the *Player's Handbook* says that monsters living in dungeons have infravision out to 120 feet; why then do some have shorter ranges? Hmm.

Superior infravision, however, involved more than simply receiving heat radiation. Creatures with long-distance infravision were noted in the 1st Edition *DUNGEON MASTER(R) Guide* (page 59) as emitting infrared light from their eyes (magically, of course), then seeing the reflected radiation. (This would not be possible in normal science, as noted earlier, but this is a magical universe we're talking about.) The eyes of any creature with infravision out to 90 feet or more are noted as glowing red quite brightly when seen by any other creature with standard infravision. Most monsters in underground areas were said to have superior infravision.

This brings up a curious point: How far away can an adventurer with standard infravision detect one with superior infravision? Can the adventurer see danger coming before the dangerous creature sees him? Well, if you get picky about it, you can say that the standard range of 60 feet is fixed; you can't see farther than that, no matter what heat source is out there. On the other hand, it is clear that the original intent of the rules was to have the 60 feet range be that at which the body-heat radiation from monsters (and normal people) could be seen. The implication is that stronger sources of infrared light could be seen if they were farther away.

A liberal DM should note that a creature with 90 feet or 120 feet infravision is actually emitting infrared beams out to 180 feet or 240 feet, respectively. All infrared light going out from its eyes must be reflected back to its eyes to be seen, so in theory those eye beams should be detectable by infravision out to those doubled ranges (assuming those eye beams don't first encounter a surface that causes them to be reflected). Furthermore, near-infrared light reflects from most normal surfaces just like normal light. A monster with superior infravision "paints" everything it sees with powerful heat rays, just as if it were carrying a double-beam flashlight. (Perhaps dwarves and gnomes have appropriate expressions like, "That troll was so close that its eyes could've burned the skin off my arm!")

Thus, a gnome wandering an abandoned mine tunnel might see the corridor ahead of her "light up" with faint infrared light if there was a duergar 240 feet ahead of her. The duergar has the advantage in having a much broader range of accurate vision, but the gnome has the advantage of early detection. The gnome can immediately flee or hide, unseen by the approaching duergar.

This argument is buttressed (and contradicted) by the note in the original *DMG* (page 59) that, outdoors, infravision allows for detection of warm or cold figures at a range of 100-300 feet. Vision is said to otherwise be equal to "a bright, starry night, with full moonlight." Cannot the duergar then see the gnome at 240 feet? What heat sources are present that allow for this greater range of vision? And if you can see up to 300 feet outdoors, why can't you see that far indoors? Game logic breaks down at this point.

To the rescue, perhaps, comes the earlier notes about a sun-warmed landscape and rod-based night vision. As a rule of thumb, let's say that a creature with infravision can see three times as far outdoors at night as it can in a deep cavern, because the landscape is warmer and radiates more infrared light. A halfling with poor infravision thus can see most outdoor objects out to 90 feet, and a duergar (with infrared eye beams) can see out to 360 feet. The gnome in the earlier example should obviously avoid meeting duergar at night in open fields; the duergar will see the gnome first.

In the original *PHB* (page 102), things seen with infravision are described as appearing in a colorless way to an observer. Warm things look bright, as if they were emitting light. Cooler things look progressively grayer, and cold things appear black. This fits with the black-and-white view of infravision developed earlier. Recent versions of the D&D game have instead substituted certain colors for different heat temperatures (*D&D Cyclopedia*, pages 24-25), and there is that nagging *PHB* note about the red-glowing eyes of a creature with superior infravision. The optional rules for infravision in the AD&D 2nd Edition game *DMG* (page 119) also allow for "pseudo-color" infravision, as typically appears in a thermogram. I'll still opt for the simpler no-color view, which makes it just

like the view you get from a sniper scope.

Does infravision work underwater? Yes, but badly. Water is a very poor conductor of heat, despite what any game rules say. Though the original *DMG* allowed infravision to work underwater to a limited extent, but it would be more accurate to cut it off completely. Cool water will dampen out nearly all heat radiation, and warm water will obscure it. I'm no scientist, but I'd give infravision an underwater range of about 1 foot, no more. Very hot sources, like a volcanic vent, will boil all the water near them and make an infravisual view of them merely bright, fuzzy blobs that fill your field of vision. If you are liberal, you can keep the limits set by the original or AD&D 2nd Edition rules (i.e., normal underground ranges).

### Getting clever with infravision

What new tricks can infravision bring to a typical AD&D game? Here are some possibilities:

Given that infravision is not as precise and focused as normal vision, the chances for mistaken identity increase when only infravision is used. An orc at a distance looks like a human or a hobgoblin; long experience and closer inspection (at great risk) will tell the difference. DMs should play up on this at every opportunity.

As a rule of thumb, a DM could say that accurate identification of a creature can be made using infravision only when the target being is one-third the distance of the spotter's infravision range. Thus, a dwarf can accurately identify a comrade at a range of 20 feet (one-third of 60 feet), and a duergar can identify a fellow monster at a distance of 40 feet.

Can you read by reflected infrared light, if no normal light is present? For the record, we will assume not, unless the heat source is very strong and the writing is only inches from one's eyes.

Thieves with infravision can learn to hide themselves from other creatures with the same power. A very powerful, blinding source of heat or the presence of many separate, man-sized sources of heat (like a group of bodies immediately after a battle) can conceal the thief's presence quite well. However, simply hiding behind a rock is no help at all, as the thief's own heat radiation will be seen around the rock's edges and "painted" over background objects. Wrapping up in a blanket might help at first, but the blanket will slowly grow warmer (and brighter). Hiding against a cold object will make the warmer thief stand out as if he were in a spotlight. If you are playing a thief (as a player or DM), imagine that character as a permanent, glowing light source. How can you hide that light? Magical *invisibility* might be the only foolproof recourse--but even that can be challenged by creatures with superb senses of hearing or smell.

The descriptions of monsters should be carefully examined to determine if any being might radiate more or less than the "usual" amount of heat. Considerable leeway is given for the DM here. A dragon turtle, which breathes steam, and a remorhaz, which is incredibly hot, are likely to put out enormous amounts of infrared light. What about a *flametongue* long sword or a *necklace of missiles*? Though it is tempting to rule otherwise, magical items might not put out any heat at all, no matter what their powers, unless the description of them in the *DMG* says they do.

Consider the infravisual effects of certain spells. *Fireball* will produce a burst of infrared light that will temporarily blind any creature totally dependent on infravision. *Incendiary cloud* is easily

distinguished from all other cloud-type spells because the cloud radiates so much heat that it glows brightly in infravision. *Burning hands* could briefly illuminate a large area like a flash bulb, if the infravision users had their backs to the spell effect so they weren't blinded by it. *Dancing lights*, which radiates no heat, could be instantly told apart from real torchlight by infravision users. *Chill touch* makes the user's hand seem black (cold) in infravision. Use your imagination with a careful touch of logic and reason for other spells.

Everything that a dwarf knows about infravision is likely known by a goblin, and vice versa. Creatures that have no infravision are more likely to fall for certain traps set by those who can see heat. For instance, a goblin stonework trap that was recently used or tested will be visible to a dwarf, who can detect the heat from the friction of stones sliding across each other. An ambush site will radiate enormous heat from the bodies of the gathered ambushers, tipping off other experienced dark-dwellers. A tank of cold water, set over a thin, wooden ceiling, will make the area around it very dark. A corridor recently hit by a *fireball* spell will radiate much heat (and probably smell burnt as well); the same corridor recently hit by an *ice storm* will seem very dark. Fresh blood and body wastes will retain high temperatures for a short time. You get the idea. Dwarf-kin and goblin-kin love battling the ignorant armies of surface dwellers who enter their realms, but hate battling each other, since they already know all the best tricks.

Certain "clean-up crew" monsters, like gelatinous cubes, take on special significance for infravision-users. A cube is assumed here to radiate no heat, and it likely blocks heat transmission as well. It might become "visible" to a dwarf or goblin because it cuts off the normally expected scenery down a corridor, as if the corridor ended abruptly in a cold wall. Humans wouldn't figure it out, but a clever dark-dweller would stop, probe, then go another direction.

Newly discarded items like clothing, armor, and weapons would reveal much to infravision, like how long they had been abandoned (depending on how cool the items were) and whether the items had been used--any warm blood on the blade? A newly set underground trap, placed by a human who was unaware of his own heat effects, would be avoided with laughable ease by a hobgoblin or gnome.

A few new magical spells suggest themselves for dark-dwellers and wizards. If there can be *light* and *continual light*, why not *infrared light* and *continual infrared light*, at the same levels of ability and with the same restrictions? A pebble with *continual infrared light* would make a dandy lantern that no human could see, though it would immediately give away itself and its user to any other infravision-using being within range.

A "light bomb" can be created by enchanting a pebble with *continual light*, then coating it with mud. Once dried, the pebble can be carried in a pouch, emitting no heat at all, until a group of infravision-using foes is met. The pebble can then be thrown against a wall as the "bomb"-carrier retreats; the burst of light will temporarily blind the foes and allow for escape. Optionally, an adventurer with the blind-fighting proficiency could close his eyes, throw the pebble (probably by the bunch), then attack, unaffected by the burst of light.

A pebble enchanted with *continual infrared light* could be used as a signaling device invisible to normal sight. Placed inside a lantern with a shutter, the pebble's radiance can be blocked or revealed by opening and closing the shutter. Given a form of Morse code, underground creatures

could signal to each other, silently and unseen, if surface dwellers approach them.

(A scary thought: In total darkness, a drow can communicate in Morse code with another drow 240 feet away *merely by blinking her eyes*. Think about it!)

A pouch full of *cold dust* would be useful for detecting approaching foes. When scattered on the ground, the perpetually low-temperature *cold dust* would quickly reveal the exact location of any being walking over it, even if the being were cold-blooded. (The *cold dust* would be much colder than the surrounding environment, providing great contrast.)

Finally, a game rules variant: sighting ranges for different sizes of target creatures. This will complicate the game a bit, but I've tried to keep the basics simple.

First, find the infravision range of the spotter (30 feet, 60 feet, etc.). Next, find the size category of the target (Tiny, Small, Man-sized, Large, etc.). Multiple the infravision range by the sighting range modifier, and that's how far the target must be before it is normally seen. It's thus harder to spot a rat with infravision than it is to spot an ogre, and you can see the ogre coming from farther away.

Target's size category	Spotter's sighting range modifier
Tiny	1/3
Small	normal
Man-sized	normal
Large	normal
Huge	4
Gargantuan	10

Using this table, a dwarf can see a hill giant (Huge) coming from 240 feet away, since the giant is so big and puts out so much heat. A goblin won't be able to see a rat (Tiny), however, until the rat is 20 feet away.

### Last thoughts

Infravision is not the only special sense that real-world and fantasy creatures have. Minotaurs and hell hounds have superb senses of smell (as do normal canines), bats use ultrasonic sonar, certain fish sense pressure changes in the water, and electric eels sense nearby electric fields, such as those from other fish. A little research and some imagination could bring these other peculiar senses to life just as this article has hopefully done for infravision. It's a strange world, and fantasy makes it all stranger (and more fun).