Can you keep a secret? Probably not as well as Doctor Who executive producer Steven Moffat's two sons, Joshua, 13, and Louis, 11. These days, nearly every television producer, director, writer, actor and caterer is apprehensive about revealing details and plot points from unaired episodes of their shows. But Moffat is the master. He even gave one of the series' characters the catchphrase “No spoilers.” He purposely misleads the press. “I lied my arse off,” Moffat told 6,500 attendees at this year's San Diego Comic-Con regarding the content of an upcoming episode. He also runs a tight spaceship: Nondisclosure agreements are as ubiquitous as silver alien masks on the British science-fiction show's set.

Joshua, however, is the first to read his dad's scripts. Louis helps vet Moffat's monsters. This past June, Matt Smith, who currently plays the time and space traveler known only as the Doctor, revealed he's leaving the show at year's end. Nearly all of England spent the summer guessing the identity of his replacement as soon-to-be next Doctor Peter Capaldi ate dinner (cooked by Moffat) at the family's house. And when it comes to the hush-hush mysteries of Doctor Who celebrates its 50th anniversary with a historic team-up of Time Lords by Aubry D'Arminio

“They have both had that experience of playing the Doctor,” says exec producer Moffat about Tennant (left) and Smith. “They’d sit and gossip away about it.”
Fifty years is a record-breaking run for a sci-fi series—but longevity (and continual reinvention) is in Who's DNA. The BBC debuted the show during teatime on November 23, 1963, and over the next three years, 12 million Britons watched the hoary First Doctor (William Hartnell) fight intergalactic beauties. Then heart disease forced Hartnell to quit. So Who's writers gave the Doctor's alien race, the Time Lords, the ability to regenerate into entirely different beings. On an October 1966 episode, Hartnell's Doctor fainted and transformed into the sprightlier, slightly shorter Second Doctor, played by raven-haired Patrick Troughton.

Doctor Who aired for 23 more years, returned as a TV movie in 1996, then upgraded to a proper series again in 2005, starring Christopher Eccleston as the Ninth Doctor. When Smith inherited the role from David Tennant in 2010, he became the 11th actor to portray the Doctor on television full-time.

Historically, Who anniversary episodes are romps—inflected, silly adventures whose plots are excuses to wrangle several of the Doctor's incarnations into one episode. When Two and Three (Jon Pertwee) argued in 1973's "The Three Doctors," they summoned One to referee. In the 1993 special "Dimension in Time," a rogue Time Lady tried to trap all the Doctors in present-day London. Doctors Three through Seven (Sylvester McCoy) re-visited—with help from the cast of the BBC soap opera EastEnders. "Fans love it when the Doctors meet. It's a groovy thing to happen," Smith says. "The Doctors are like, 'You're the Doctor? You're not the Doctor? It's funny and ridiculous.'"

The Day of the Doctor unites Smith's baby-faced Eleven and Tennant's quixotic Ten with the well-worn War Doctor, played by John Hurt—but it's not the traditional jaunty Who-versary. It's the most significant day of the Doctor's life, the one he claims to have been running from for 900-plus years. And it will leave a major footprint on the show going forward. "Most Doctor Who stories aren't about the Doctor," Moffat says. "They're about people he meets, monsters he defeats and plans he spoils. But this is the Day of the Doctor. This one will stick with him and change certain ways he thinks."

Here's what we know for sure. The special will resolve questions the series has been setting up since Smith's first full-length episode. "The Eleventh Hour." The Doctor doesn't even tell you his name," points out Moffat. "What other secrets does he keep?"

Hurt's grizzled soldier is an altered version of the Eighth Doctor (Paul McGann), and this is the only time we'll see him. The action is spread over at least two worlds and three time periods: Elizabethan England, contemporary London and the Doctor's home planet, Gallifrey, during the Great Time War between the Time Lords and their nemesis the Daleks. (Off screen, between the 1996 movie and the 2005 reboot, the Doctor stopped the carnage by incinerating the entire Dalek army and all his fellow Time Lords. He's been having a difficult time with that.)

In 1962, Ten gets frisky with the Virgin Queen (Joanna Page) and complains about how Eleven rechristened the TARDIS, the Doctor's signature spaceship that resembles a blue 1950s police call box. "It's amazing how Ten and Eleven are almost total opposites, but also very similar," says Jenna Coleman, who plays the Eleventh Doctor's traveling companion, Clara Oswald. "They'll spar, and then they realize they actually get on, and then they argue. It's a person arguing with himself."

Outside the TARDIS, Tennant and Smith got on like Galifrey on fire. "There are not many people in the world who know what it is to play the Doctor and to live the part of the Doctor," explains Smith. "What was pretty exciting is that David got that." Remembers Coleman: "They ended up getting on so well, I was like, 'Hey, guys, can I get a bit of attention?'"

In addition to the Daleks, the one-hit wonder Zygons—not seen in their alien form since their first episode 38 years ago—supply Day of the Doctor's danger. The orangey-red Zygons are amphibious humanoids from the planet Zygor, with cross-eyed, fur-covered eyes. They have bad, pointy teeth and the technology to transform themselves into other creatures—including humans. After crashing to Earth, they hid underwater in Scotland, living off the milk of their cybernetically enhanced dino-saur-like Skarasen, whom humans assume to be the Loch Ness Monster.

The Zygons are a Moffat favorite. "They're a design classic," says the fanboy. "Normally on Doctor Who, if we've got a hit, we trot it out 20 more times. I wanted them to have another go."

Back in 1975, the Fourth Doctor (Tom Baker) threw down against the Zygons alongside UNIT (the Unified Intelligence Taskforce), a human military squad that combats ghosts and aliens. In Day of the Doctor, their head of scientific research, Kate Stewart (Jemma Redgrave), summons Eleven to Trafalgar Square in 2013, where something spooky is going on in London's National Gallery. (Smith was hoisted more than 90 feet in the air to film the TARDIS's landing.) Nine and Ten's companion Rose Tyler (Billie Piper) is also back—and in her yellow-eyed "bad wolf" state, which enabled her to defeat the Daleks and make a man immortal.

Moffat confesses to having already fudged a little about what occurs in the anniversary special. To hint at what might be, he says, "would be exposing tremendous secrets." Many speculate (or hope) that he has kept other cameos under wraps.

This one will be the national sport at the moment: guessing who is and who isn't going to be in the 50th," joked Eighth Doctor McGann at the British Film Institute in October. McGann then made a surprise appearance in the teaser webisode "The Night of the Doctor," which revealed that his Doctor morphed into Hurt's. Either way, when the 75-minute special (which is airing in 2-D and 3-D simultaneously in more than 75 countries) ends, Smith has only one episode left. Ratings-wise, his Eleventh Doctor is the most popular Time Lord ever in the U.S. and has made Doctor Who the BBC's most successful brand. Next month, in the Christmas special, Eleven will regenerate into Capaldi's Twelfth Doctor. Eleven sees his end coming, but Smith won't elaborate. "The last scene I filmed, I was swinging on a wire toward a camera," he says, "and I've said too much already! I'm going to the bitter end, I keep it spoiler-free."